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The History of the 1949-50 Freshman Class.....*Dykman, Stalnaker*

The Study of Microbiology.....*Colin M. MacLeod*

The Study of Applicants, 1954-55.....*John M. Stalnaker*

Integration of Clinical and Preclinical Studies.....*I. Davidsohn*

Some Results of the Cancer Teaching Program.....*Raymond F. Kaiser*

REPORT OF THE 66TH ANNUAL MEETING

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Sodeman's PATHOLOGIC PHYSIOLOGY

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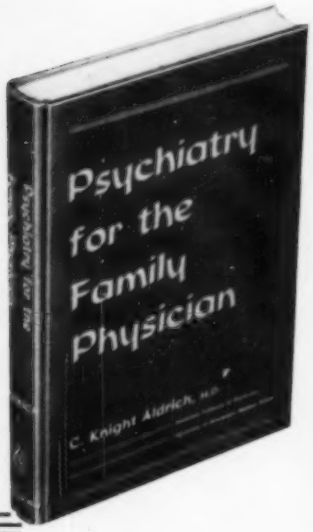

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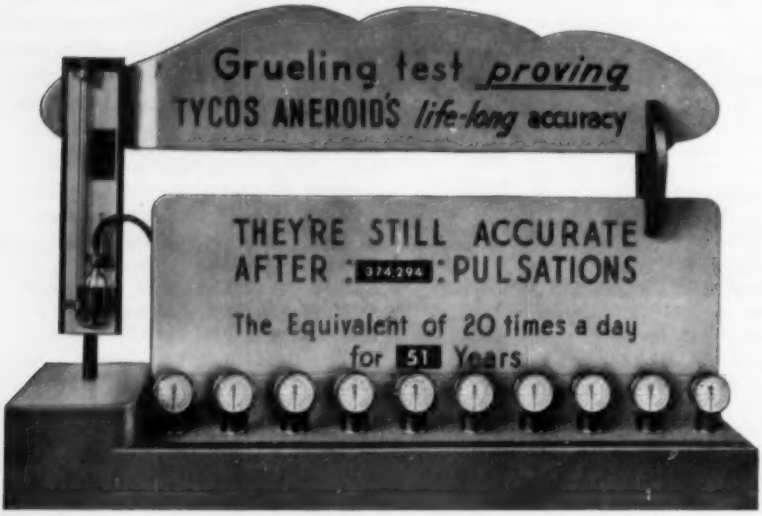

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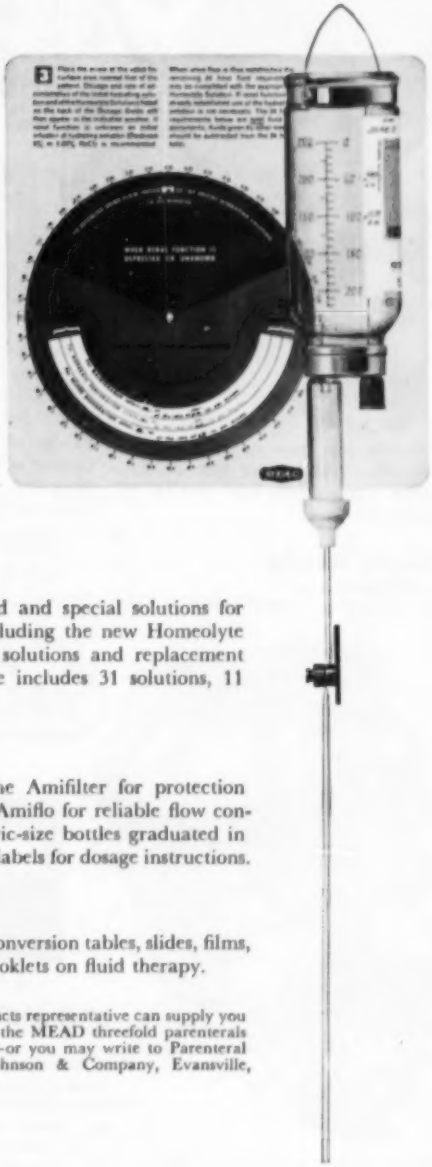

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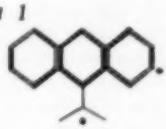

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Teaching Institute on Anatomy and Anthropology—October 19-22; Swampscott, Mass. (New Ocean House). (Attendance by invitation only).

American College of Anesthesiologists—November 4-5; Hotel Statler, Boston.

American College of Surgeons—October 31-November 4; Conrad Hilton Hotel, Chicago.

American College of Cardiology, Interim Meeting—November 10-12; Hotel Claridge, Memphis, Tenn.

American Society of Tropical Medicine and Hygiene—November 2-5; The Somerset Hotel, Boston, Mass.

International Academy of Pathology—April 24-26; Cincinnati, Ohio.

National Association for Mental Health — November 1-6; Sheraton-Lincoln Hotel, Indianapolis, Ind.

Pan American Congress of Ophthalmology—January 9-14, 1956; Santiago, Chile.

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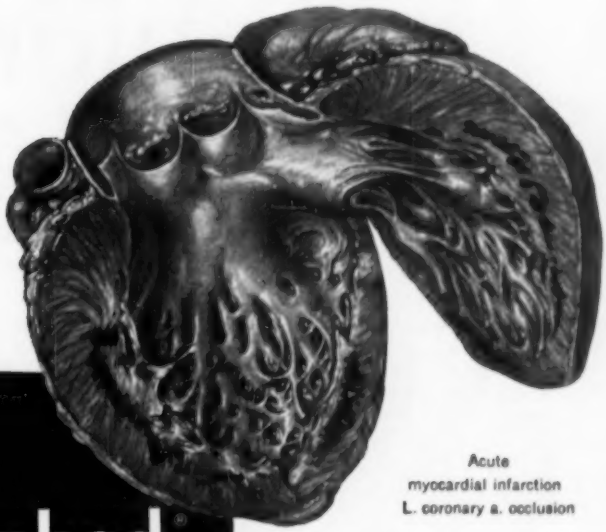
secondary to myocardial infarction



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1. Gazes, P. C., Goldberg, L. I., and Darby, T. D.: *Circulation*, 8: 883, Dec., 1953.

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References (1) Altemeier, W. A.; Culbertson, W. R.; Sherman, R.; Cole, W.; Elstun, W., & Fultz, C. T.: *J.A.M.A.* **157**:305, 1955. (2) Kutscher, A. H.; Seguin, L.; Lewis, S.; Piro, J. D.; Zegarelli, E. V.; Rankow, R., & Segall, R.: *Antibiotics & Chemother.* 4:1023, 1954. (3) Clapper, W. E.; Wood, D. C., & Burdette, R. L.: *Antibiotics & Chemother.* 4:978, 1954. (4) Sanford, J. P.; Favour, C. B.; Harrison, J. H., & Mao, F. H.: *New England J. Med.* **251**:810, 1954. (5) Balch, H. H.: *Mil. Surgeon* **115**:419, 1954. (6) Sanford, J. P.; Favour, C. B., & Mao, F. H.: *J. Lab. & Clin. Med.* 45:540, 1955. (7) Felshin, G.: *J. Am. M. Women's A.* **10**:51, 1955. (8) Jones, C. P.; Carter, B.; Thomas, W. L., & Creadick, R. N.: *Obst. & Gynec.* 5:365, 1955. (9) Kass, E. H.: *Am. J. Med.* **18**:764, 1955. (10) Stein, M. H., & Gechman, E.: *New England J. Med.* **252**:906, 1955. (11) Yow, E. M.: *Postgrad. Med.* **17**:413, 1955.

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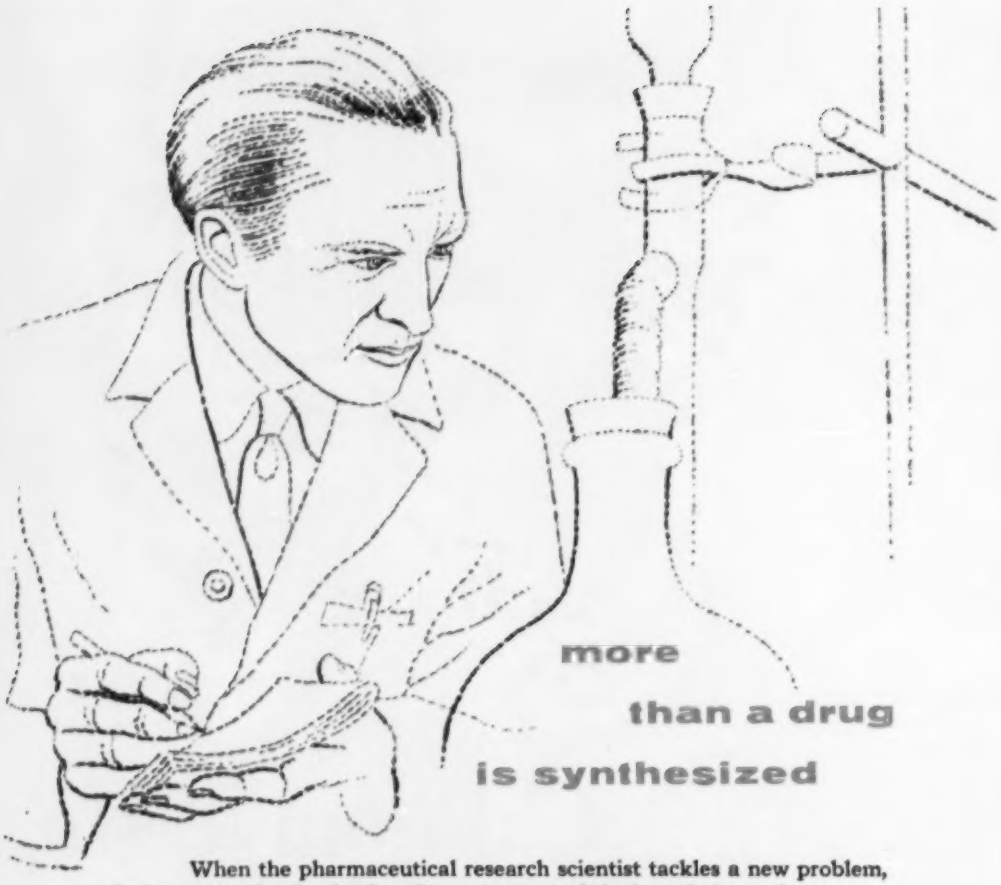

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H. L. Daiell, M.D., Scientific Director

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The History of the 1949-50 Freshman Class

ROSCOE A. DYKMAN AND JOHN M. STALNAKER

THIS study is a statistical history of the 1949-50 freshman class. It is based on the records supplied by the 79 medical schools in operation at that time. The primary purpose of this study is the consideration of factors which are believed to be related to regularity in attending medical school.

The present in-school study was designed to complement the annual applicant study. It will be possible within a few years to carry out a longitudinal study following a student from the time he applies to medical school until he has completed his medical education. Students are divided into three groups in this study as follows: 1. *Regulars*—These are students who complete their medical education in the usual four-year period with no interruptions.

2. *Irregulars*—These are students who complete their medical education on a part-time basis, who fail some part of the medical school course or who withdraw from school and later return. This category includes a small number of outstanding students who have interrupted the regular sequence of the M.D. program for such reasons as additional training in certain areas, research and teaching.

   a) *repeaters*—This is a subdivision of the irregular category and includes students who attend medical school on a part-time basis and those who fail some part of the medical school course.

3. *Drop-outs or withdrawals*—These are students who withdrew from medical school and did not return.

In order that the reader may understand the tables which will be presented in this study, it is necessary to describe certain details of record keeping in the Association office. The irregular category serves as a "catch-all" for students who are not classified as regulars or drop-outs. A small number of regular students are continually moving into the irregular or

Mr. Dykman was the assistant director of studies of the Association at the time this report was prepared and is now associate professor of psychology, department of psychiatry, University of Arkansas. Mr. Stalnaker was director of studies of the Association at the time this report was prepared, and is now president of the National Merit Scholarship Corporation. The authors wish to acknowledge their indebtedness to J. Edwin Foster, director of the Medical Audio-Visual Institute, who advised us in the preparation of the figures.

drop-out categories. If the students who drop out return, they are then classified as irregulars. Also, a small number of irregulars are continually moving into the drop-out file. The drop-out file is reserved for students who withdraw and do not come back to school. At the end of the normal four-year medical education program, the irregular file consists of a hard core of "interrupters" who have persisted in their efforts to obtain a medical degree despite their difficulties. Most of the irregulars graduate.

Results

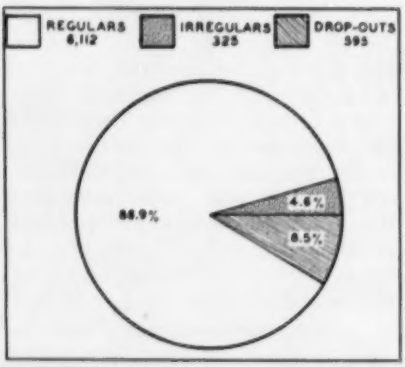


Figure 1. Percentage of regulars, irregulars, and drop-outs in the 1949-50 class

Number and percentage of regulars, irregulars and drop-outs. Figure 1 shows the distribution of student groups in this 1949-50 class. In the total class of 7,032 students there were 6,112 students (86.9 per cent) who could be classified as regulars. The corresponding percentages for irregulars and drop-outs are 4.6 per cent and 8.5 per cent, respectively.

Table 1 indicates the fate of the 325 irregular students. Most of these were still in medical school after their class graduated in the spring of 1953. It is interesting that so many of these students have succeeded: 8.6 per cent of them graduated with no loss of time in 1953; 74.2 per cent of them had graduated within the following year; and 11.1 per cent of them are still in school.

Total actions of the three student groups. Table 2 summarizes the actions of students within the normal four-year period of medical studies —from the fall of 1949 to the spring of 1953. The irregular section of the table indicates that 157 students of the 325 in this group withdrew and returned, five students withdrew and returned twice, three students withdrew and re-entered, and repeated, etc. The records that we receive from the medical schools do not enable us to separate students who attend school part-time from those who fail and repeat work. The classification repeater as used in this paper includes both of these categories of students. Only 11 of the 325 irregulars were involved in multiple actions, the majority withdrew or repeated once.

Table 1 • Fate of Irregular Students

	Number of students	%
Reports not yet in	9	2.8
Graduated in 1952	5	1.5
Graduated in 1953	28	8.6
Graduated in 1954	241	74.2
Still in school	36	11.1
Withdrew and have not returned	6	1.8
Total	325	100.0

Table 2 • Total Activity of the 1949-50 Freshman Class

Student Groups	Action	Number of students
Regulars	Remained in one school	5839
	Transferred to another medical school	273*
	Total	6112
Irregulars	Withdrew once and returned	157
	Withdrew and re-entered twice	5
	Withdrew and re-entered, and repeated**	3
	Repeated once	157
	Repeated twice	3
	Total	325
Drop-outs	Withdrew once	527
	Withdrew and re-entered, and withdrew	32
	Withdrew and re-entered, and repeated and withdrew	1
	Repeated once and withdrew	34
	Repeated once and withdrew, and re-entered and withdrew	1
	Total	595
	Grand total	7,032

*Most of these are students transfering from two to four-year medical schools. There is no interruption in the medical education of any medical student who is classified as regular.

**Repeated refers to students who attend school part-time or students who have failed part of their medical school course.

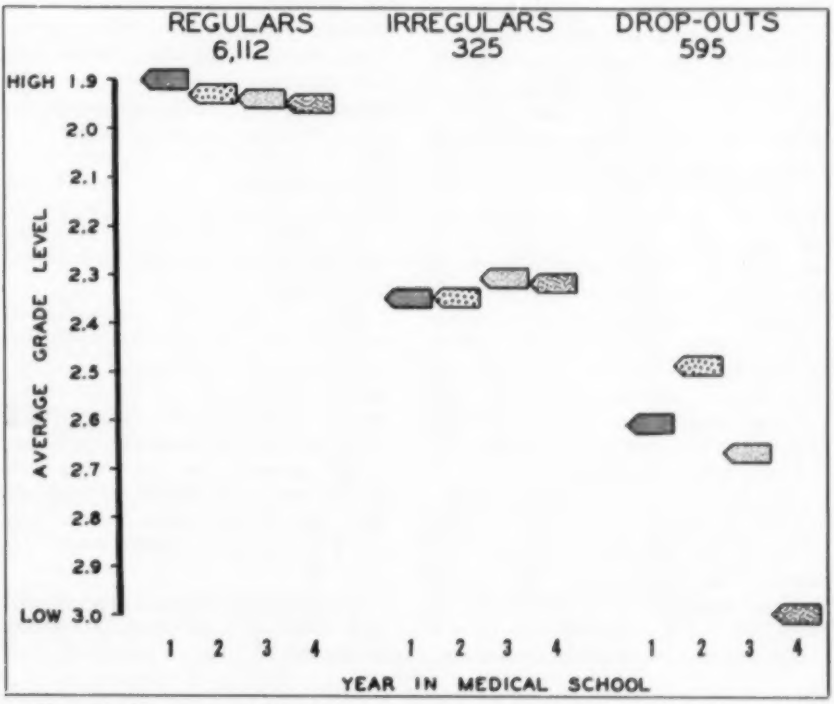


Figure 2. Average grade levels for the student groups by year in medical school

Table 3 • Average MCAT Scores for Three Groups

	Number of students tested*	V	Q	MS	Sci.
MCAT Regulars.....	4572	541	542	536	549
MCAT Irregulars.....	241	526	518	513	519
MCAT Drop-outs.....	372	521	503	515	505

*Test scores were available for 75 per cent of the regulars, 74 per cent of the irregulars and 63 per cent of the drop-outs.

Average grade levels for the three student groups. Figure 2 shows the average grades for the regulars, irregulars and drop-outs. Grades are reported to this office in terms of the third of the class in which a student stands: a "1" indicates upper third, a "2" indicates middle third, and a "3" indicates lower third. As would be expected there is a sharp differentiation in the grades of the three groups.

Scores on the Medical College Admission Test. It may be helpful to briefly describe the MCAT. It consists of four sections as follows: (1) Verbal ability—this provides evidence of a student's ability to read, understand and write at the professional school level. (2) Quantitative ability—this provides similar evidence regarding numerical and computational skills. (3) Understanding modern society—this covers fields of history, economics, political science and sociology. (4) Science—this includes a wide sampling of concepts and problems taken from the basic college courses in biology, chemistry and physics. This latter section measures the student's grasp of the fundamental principles of science.

The scores for each section of the MCAT are scaled so that the average score of all applicants on each section of the test is 500. The scores range from a low of 200 to a high of 800. The following scale gives the normal distribution of 100 applicants:

Score interval	200-299	300-399
Normal distribution of 100 students	2	14
	400-499	500-599
	34	34
	600-699	700-799
	14	2

The average MCAT scores of regulars, irregulars and drop-outs are given in Table 3. The science section of the MCAT reflects the greatest average difference between the three student groups; the difference between the average scores of regulars and drop-outs is 44. In order of the magnitude of average difference, the other test sections are arranged from high to low as follows: quantitative ability, modern society and verbal ability. The MCAT scores for all three groups are higher than the average scores obtained by medical applicants.

Figure 3 shows the percentage of regular, irregular and drop-out students in various score ranges of the MCAT. The lowest bar for the verbal section of the MCAT shows that one-third of the six students who had verbal scores in the score range 200 to 250 were irregular or dropped out. Thus about two-thirds of the students in this score range were regular.

It is evident from these graphs that students with very low scores on the MCAT have a relatively high

probability of irregularity or withdrawal. The modern society section shows that students who have scores between 200 and 250 have a 44 per cent probability of irregularity or withdrawal. At the other end of the modern society scale (scores in the range 750-800) the probability of nonregularity is 11 per cent. The total number of cases lying in each bar at the extremes of the distributions is low, and chance fluctuations will alter these percentages appreciably. Nonetheless, the over-all consistency of the results on the four sections of the MCAT indicates that low scores prognosticate nonregularity. Nonacademic factors loom large in the success of any particular student, and these results should be cautiously interpreted. The fact that the MCAT results turned out the way they did is somewhat surprising. The majority of the students entering this class had been selected (in part) on the basis of their scores on the MCAT, and the test had eliminated in advance many poor students.

An interesting sidelight is the fact that more irregulars and drop-outs come from the group of students not taking the MCAT than from the group of students taking the MCAT. Of the 920 irregular and drop-out students in this class, 613 took the MCAT. Altogether in this class of 7,032 students, 5,185 took the MCAT (73.7 per cent of the entire group). Of the 1,847 students who did not take the MCAT, 307 (16.6 per cent) were either irregular or dropped out of medical school. The group of students who took the MCAT had 11.8 per cent students who were irregular or dropped out. The significant difference in these two percentages indicates that students who took the MCAT were better students on the average than those who did not take the MCAT.

The percentage of students who take the MCAT has risen sharply since the introduction of the test in 1948. More schools require the test each year. It is estimated that about 95 per cent of the applicants admitted in the fall of 1955 will have taken the MCAT.

At certain individual medical schools, scores on the MCAT are not related to criterion variables such as grades and drop-outs. Any factor which tends to restrict the MCAT

Table 4 • Relative Frequency of Reasons for Withdrawal

Reasons	Freshmen %	Sophomores %	Juniors %	Seniors %	Total %
Failure	58.5	50.5	27.5	33.4	54.3
Lack of interest	16.3	5.0	7.5	8.3	13.3
Illness or accident	8.3	9.2	22.5	16.7	9.6
Emotional	3.1	0.8	15.0	8.3	3.5
Family problems	3.1	0.8	2.5	—	2.5
Financial	2.1	1.7	2.5	—	2.0
Moral	0.7	—	—	—	0.5
Transfers*	0.7	12.6	—	—	3.0
Death	0.2	3.4	2.5	8.3	1.2
Graduate study	0.2	4.2	5.0	—	1.3
Marriage or pregnancy	0.2	1.7	2.5	—	0.7
Not specified	6.6	10.1	12.5	25.0	8.1
Total %	100.0	100.0	100.0	100.0	100.0
Total number	424	119	40	12	595

*Includes students who left school for purpose of transfer, but who did not return to another medical school.

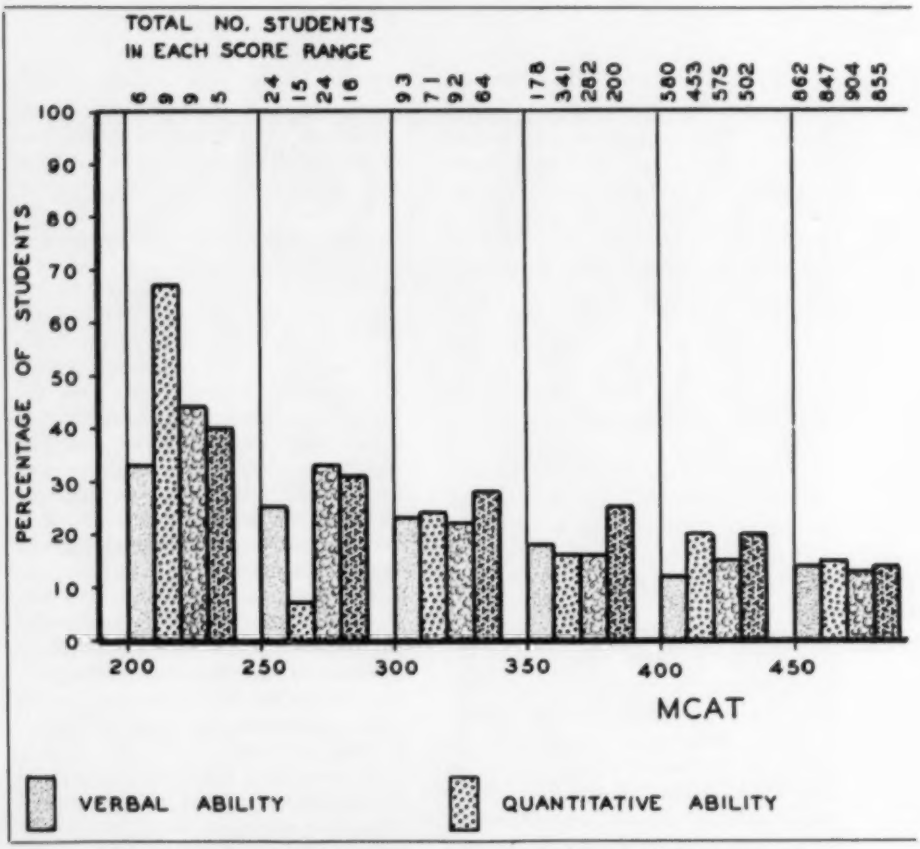


Figure 3. Percentage of irregulars or drop-outs in each MCAT score range

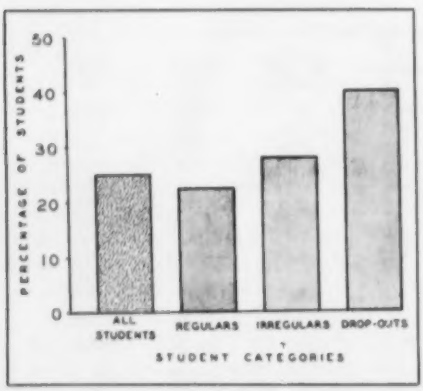
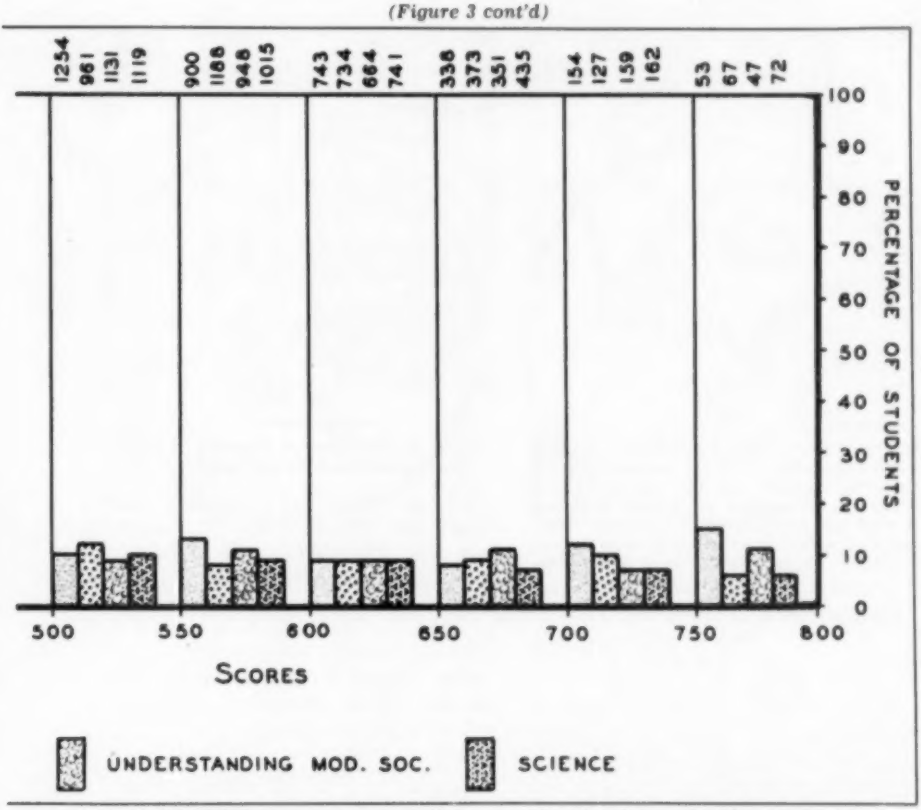


Figure 4. Percentage of students in each student group who were 25 years or older upon entering medical school

scores—residence or other restrictions —reduces the correlation between scores on the MCAT and the variable being predicted (grades, drop-outs, irregulars, etc.). On the positive side, a school that uses the MCAT properly has eliminated many students in advance who would get into difficulty because they lack the requisite abilities. This healthy restriction of the total population reduces the correlation. On the negative side, a school that has state residence restrictions or any restrictions for that matter, may have to obtain a majority of its students from a low or average MCAT score range. Both of these cases resolve to predicting from a

(Figure 3 cont'd)



limited MCAT score range— a "constant"—to a variable, which, depending on the total variability, lowers the correlation coefficient.

Statistical techniques are available for surmounting some of the difficulties that arise in attempting to relate MCAT scores and certain criterion measures. Schools contemplating studies to probe this relationship should obtain the advice of an expert statistician.

Relationship between age and regularity in attending medical school. Figure 4 shows the percentages of total regulars, irregulars and drop-outs who are over 25 years of age. About 24 per cent of the students in this class were 25 or older when they entered medical school. The drop-out group contains a disproportionate share of older students.

Figure 5 shows the relationship between age and drop-outs. The point A indicates that 13 per cent of the 1,465 students who are 27[1] years old at the time they enter medical school drop out.

Relationship between age and scores on the MCAT and age and grade levels. Figures 6 and 7 contain these data. Students have been classified into two age groups for this presentation, under 30, and 30 and over. The differences between average grade levels in the two groups are

---

To be technicaliy accurate, we should say that 13 per cent of the students who are between 24.5 and 29.4 years drop out. Figure 5 is a plot of the mid-points of the successive age ranges 14.5 to 19.4, 19.5 to 24.4, 24.5 to 29.4, 29.5 to 34.4 and 34.5 to 39.4.

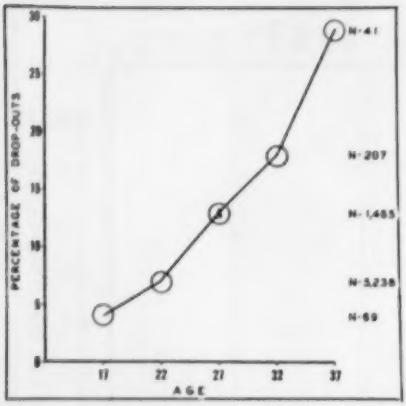


Figure 5. Percentage of students entering medical school in each age range who drop out. The numbers on the right are the totals for the number of students entering in each age range. Twelve students whose age at the time of entering medical school could not be determined were eliminated.

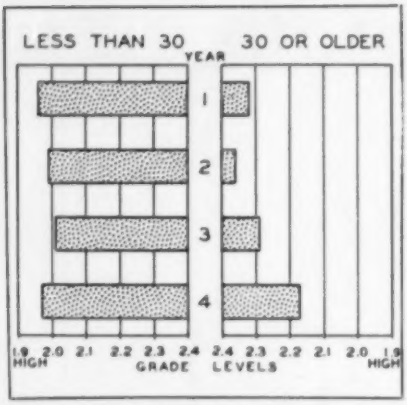


Figure 6. Relationship between age and average medical school grade levels

striking. Older students achieve higher verbal and modern society scores, but their quantitative and science scores are much lower.

Sex distribution of the students in this 1949-50 class. Figure 8 contrasts the success of men and women medical school students. There were 394 women in this medical school class, (5.6 per cent of the total class), and 6,638 men. Figure 8 shows that 13.5 per cent of the 394 women withdrew, and 8.2 per cent of the 6,638 men withdrew. Approximately 87 per cent of entering men and 81 per cent of entering women finished their medical education as regulars. Thus, men students are somewhat more successful on the average than women students.

Grades and MCAT scores of men and women medical students. Figure

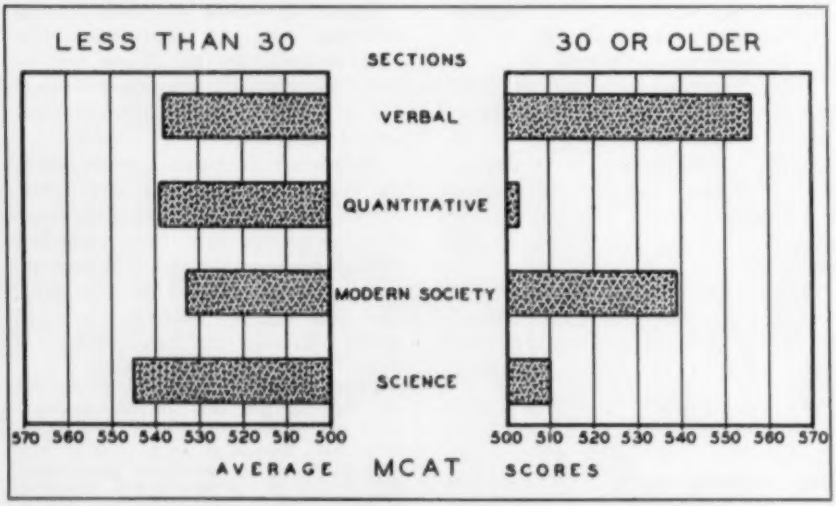


Figure 7. Relationship between age and scores on the MCAT

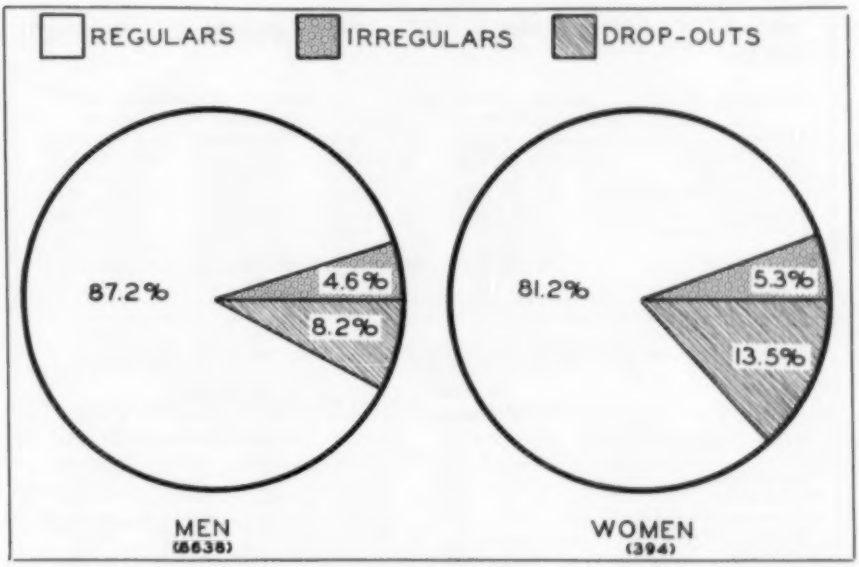


Figure 8. Percentage of total men and women students falling into each student group

9 shows that women medical students have slightly lower average grades than men, particularly in the senior year. Figure 10 indicates that women obtain higher average verbal scores and lower quantitative scores than men. We would guess that the slightly lower science and modern society scores of women are not important in predicting medical school grades, and that any lack of quantitative ability on their part is compensated for by their superior language ability. Combining the results here with those given in Figures 6 and 7 for age, supports further the conclusion previously drawn that the science section of MCAT is the most important of the four sections of the test in predicting medical success. Older students have lower average scores on both the science and quantitative sections of the test and obtain much lower grades than younger students. Women obtain higher verbal and lower quantitative scores. It is possible, however, that sex and age differences in motivation or other personality characteristics might account for these results.

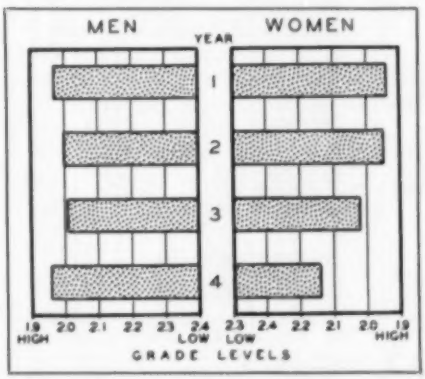


Figure 9. Success of men and women medical students as reflected by grade levels

Analysis of drop-out reasons. Table 4 classifies students who withdraw from medical school and who do not return by reason of withdrawal. The medical schools indicate for each student who drops out what is believed to be the reason for withdrawal. About 58.5 per cent of the 424 freshmen who drop out do so because of failure, and 16.3 per cent

Table 6 • Percentage of Withdrawals in 1949-50 Class by Class Standing and Sex

Reasons	Freshman Class		Upper Classes	
	Men	Women	Men	Women
Failure	230 (59.0%)	18 (53.0%)	73 (48.0%)	2 (10.5%)
Lack of interest	66 (16.9%)	3 (8.8%)	8 (5.3%)	2 (10.5%)
Miscellaneous	30 (7.7%)	2 (5.9%)	38 (25.0%)	4 (21.1%)
Illness, accident and death	30 (7.7%)	6 (17.6%)	24 (15.8%)	4 (21.1%)
Environmental problems	19 (4.9%)	4 (11.8%)	2 (1.3%)	6 (31.5%)
Personality problems	15 (3.8%)	1 (2.9%)	7 (4.6%)	1 (5.3%)
Totals	390 (100.0%)	34 (100.0%)	152 (100.0%)	19 (100.0%)

Table 7 • Average MCAT Scores for Drop-outs in the 1949-50 Class*

Reasons	Number of cases	Test Sections V	Q	MS	Sci.
		Freshman withdrawals			
Failure	153	500 (1)	479 (3)	487 (1)	478 (1)
Lack of interest	40	544 (6)	545 (6)	551 (6)	535 (6)
Miscellaneous	20	531 (4)	524 (5)	542 (3.5)	508 (4)
Illness, accident and death	17	530 (3)	496 (4)	542 (3.5)	498 (3)
Environmental problems	14	514 (2)	469 (1)	503 (2)	490 (2)
Personality	10	541 (5)	474 (2)	548 (5)	522 (5)
Total	254				
		Upper class withdrawals			
Failure	48	500 (1)	509 (1)	491 (1)	493 (1)
Lack of interest	8	589 (4)	524 (4)	561 (3)	561 (5)
Miscellaneous	31	542 (2)	517 (2)	528 (2)	548 (3.5)
Illness, accident and death	20	558 (3)	536 (5)	570 (4)	548 (3.5)
Environmental problems	6	593 (5)	523 (3)	580 (5)	537 (2)
Personality	5	629 (6)	615 (6)	607 (6)	633 (6)
Total	118				

*Only 372 of the 595 students who dropped out took the MCAT.

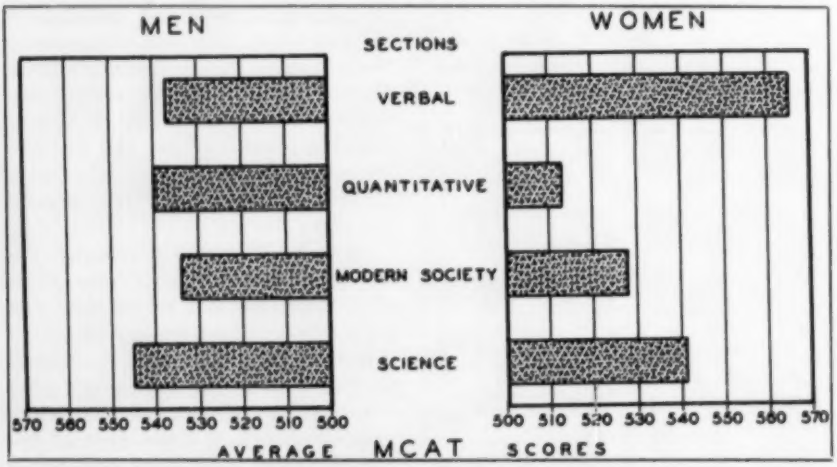


Figure 10. Success of men and women medical students as reflected by scores on the MCAT

Table 5 • Permanent Withdrawals in the 1949-50 Class by Class Standing and Age

Reasons	Freshmen		Upper class		Totals
	29 and under	30 and over	29 and under	30 and over	
Failure.....	233 (58.1%)	15 (62.5%)	70 (43.5%)	5 (50%)	323 (54.3%)
Lack of interest..	65 (16.3%)	4 (16.7%)	10 (6.2%)	—	79 (13.3%)
Miscellaneous...	35 (8.8%)	—	39 (24.2%)	3 (30%)	77 (12.9%)
Illness, accident and death.....	33 (8.3%)	3 (12.5%)	26 (16.1%)	2 (20%)	64 (10.8%)
Environmental problems.....	18 (4.5%)	2 (8.3%)	8 (5.0%)	—	28 (4.7%)
Personality problems.....	16 (4.0%)	—	8 (5.0%)	—	24 (4.0%)
Totals.....	400 (100.0%)	24 (100.0%)	161 (100.0%)	10 (100.0%)	595 (100.0%)

of the freshmen who drop out do so because of a lack of interest. It will be noted that very few juniors and seniors drop out.

Relationship between age and reasons for dropping out of medical school. Table 5 contains these data. Drop-out reasons are grouped as follows in this and subsequent tables: (1) Failure. (2) Lack of interest. (3) Miscellaneous—includes students who have transferred to another medical school, students entering graduate work and students for whom no information was supplied. (In this, only those transfer students are counted who left one medical school with the stated purpose of entering another one, but failed to matriculate at that other medical school.) (4) Illness, accident and death. (5) Environmental problems —includes family problems, marriage and pregnancy, and financial difficulties. (6) Personality and character —includes emotional and moral reasons.

The designation upper class in Table 5 refers to sophomores, juniors and seniors. Of the 400 freshmen who were 29 years of age and under 58.1 per cent withdrew because of failure, and of the 24 freshmen 30 and older 62.5 per cent withdrew because of failure.

The format of Table 6 is identical to Table 5 except that the classification is on the basis of sex rather than age. Illness, accident and death, and environmental difficulties cause relatively more women to withdraw than men and the opposite is true for failure.

Relationship between MCAT scores and reasons for drop-out. Table 7 shows that students who fail whether during first or later years have the lowest MCAT scores. Whereas, the freshman group dropping out of school because of a lack of interest has the highest MCAT scores, the upper class group dropping out for personality reasons has the highest MCAT scores. The bracketed numbers adjacent to average scores in Table 7 rank the MCAT scores for each drop-out reason.

The Scope of Microbiology

COLIN M. MacLEOD

IT BECAME APPARENT early in the discussions of the Teaching Institute that, although microbiology may have problems, they seemed to be minor as compared to those facing pathology. This realization had a strong influence on what was discussed and, as a result, pathology was talked about most of the time and relatively little attention was paid to microbiology.

From the summaries of the discussions, one gets little idea of the variations in course content and approach to teaching of microbiology in different medical schools although it is clear that in some it is taught entirely from the standpoint of its practical use in clinical medicine. At the opposite extreme there have been courses in which medical implications were all but excluded. Neither of these was considered a proper orientation for the teaching of medical students. Most departments of microbiology in American medical schools are staffed mainly by people with a Ph.D. rather than an M.D. degree. In general this is reasonably satisfactory provided one of the senior members of the department has had clinical training so that he can act as a liaison with clinical medicine and keep the teaching of microbiology realistic with respect to the needs of medicine.

The scope of any discipline depends in good part upon the training and interests of the persons who practice it. It is well to remember that none of the subjects in medicine is a science in the sense that mathematics, chemistry and physics are sciences. All of our medical disciplines in the final analysis are composed in lesser or greater degree of these three basic sciences. In this sense to state that pathology is a science is inaccurate and the same can be said of microbiology. Pathology, however, can be as much as you want to make it. After all, the name means "the study of disease," so that if the pathologist wishes to be possessive all that is left for the remaining disciplines is the physical examination of the normal human, a little preventive medicine, and running the dean's office!

Pathology is used as an example of what one can do with a designation if he wishes to work it for all it is worth. Look for a moment at the term "microbiology." Superficially it sounds as though it comprehends the biology of all small things, including the individual cells of multicellular animals such as man. To use it in this sense, however, is bad etymology and leads to confusion. It is not microbiology but rather microbe-biology

Dr. MacLeod is professor of microbiology, New York (N. Y.) University College of Medicine. This article is adapted from a paper given at the first session of the 65th Annual Meeting of the AAMC at French Lick. Dr. MacLeod was one of the participants in the Teaching Institute on Pathology, Microbiology, Immunology and Genetics held the previous week.

that is meant, and it is in its latter and proper sense that we wish to use it. The discipline comprehends the properties of microbes both as free-living forms and in their relation to the host whether they cause disease or not. Medical microbiology, then, has a large measure of ecology in it and infectious diseases should be considered as ecological phenomena. Microbiology is *not* a part of pathology, although certain techniques are used in common by both subjects, any more than it is a branch of biochemistry because microbes metabolize. It is distinguished from both by its subject matter—the techniques are unimportant—and is a part of the larger realm of biology.

Medical microbiology grew up as bacteriology within departments of pathology because that was where the microscopes were and the people who were interested in using them to study disease. It was great good fortune, not only for microbiology but also for medicine in general, that gradually it split away from the pathology that has been so concerned with the morphology of the end results of disease. At the present time there remain very few combined departments in the United States and the only part of microbiology that is commonly left with the pathologists is the service function—the running of the clinical laboratories in microbiology which are generally under the control and direction of the pathologist in the name of clinical pathology. It was interesting to find that the pathologists want to hang on to the service part of microbiology. Paradoxically, this attitude has permitted microbiologists to proceed actively with original investigations that have been of such enormous benefits to mankind during recent years. Financially, however, the pathologists have got richer and the microbiologists progressively poorer—but in general the microbiologists seem to be reasonably contented with the simple pleasures of the poor.

A word should be said about the subject of service functions at this point. It is our belief that a medical school, as part of a university, has the ancient missions of a university—to advance knowledge and to disseminate it. Service functions have significance to the degree that they support that mission. They cannot be the primary purpose of a school in a university and, if they become so, are well on the way to destroying one of the most priceless heritages of Western culture—the spirit of the university.

Let us turn to the subject matter of medical microbiology. It includes, first, the biological properties of bacteria, viruses, rickettsiae, fungi and protozoa especially as they relate to disease, and is deeply concerned with the crucial topic of pathogenesis. One must be aware of the properties of both the host and the microbes and how they interact. Factors of host resistance, therefore, occupy a major portion of the studies and teaching in microbiology.

Historically, study of immune reactions and of hypersensitivity have been associated with microbiology because antibodies were discovered during investigations of infectious agents and have been most persistently studied from this point of view ever since. Immunology continues to be taught mainly in departments of microbiology and year by year demands an increasing amount of attention. With the advent of successful antibacterial chemotherapy, a large segment of acute infections has become of relatively less importance; at the same time the role of the immediate and delayed types of hyper-

sensitivity in human disease becomes steadily more apparent as is true also of antigen-antibody reactions of hemolytic diseases of infant and adult life. Finally, a sound knowledge of immunology is required in order to understand the specific prophylaxis of infectious diseases. In one of the discussion groups, someone remarked that, "immunology is properly a part of pathology." In reality it is not a part of any other discipline. It includes a series of techniques and a unique body of knowledge available to any of the medical subjects.

The antimicrobial drugs have changed remarkably the face of microbiology in the past 15 years. Problems of microbial resistance have made microbiologists in general aware of the implications of genetics and its importance in medicine. It is our conviction that one cannot teach modern medical microbiology unless a genetic approach is taken to problems such as those of virulence, to chemotherapeutic agents, appearance of new viral strains, and to an understanding of the A-B-O, Rh and other blood groups and the diseases associated with them.

Chemotherapy is an important part of microbiology at present and will continue to be so. It is appropriate in the preclinical years for microbiology to teach the antimicrobial action of drugs both *in vitro* and *in vivo*, leaving to pharmacology and to pathology discussion of absorption, distribution, metabolism, excretion and toxicity of the agents. With respect to toxicity, however, it should be noted that those manifestations associated with the hypersensitive state are commonly handled in microbiology.

It is possible to sketch the scope of microbiology in broad strokes only. It should be apparent that it is a very lively subject and getting more so every day. As taught at present it is a vastly more interesting subject that it was 25 years ago when emphasis was not on pathogenesis and process but on learning the deadly dull reactions of bacteria when grown in various culture media.

Its emancipation from classical pathology has been an important factor in its development. Medical microbiology considers itself as a part of biology (as contrasted with necrology), and therapy has been enormously enriched. We believe that as a subject of the medical curriculum it will continue to grow in interest and usefulness.

The Study of Applicants, 1954-1955

JOHN M. STALNAKER

AGAIN THIS YEAR—for the fifth consecutive year—the number of students applying for admission to medical school has decreased, although the decrease this year is slight. Next year it is anticipated, there will be an increase. College graduates are expected to increase in numbers from now on, although the large increases will not come until 1959. Applicants to medical school should increase in number.

Table 1 lists the figures for the number of applicants for the past eight years. For the freshman class of 1954-55, there were 140 fewer applicants than for the class which entered in 1953-54, and almost 10,000 fewer than in the peak year of 1949-50.

There were 14,538 individuals competing for admission to medical school, or about two for each of the 7,500 places. Of these, a certain proportion will apply again after one more year of college and some 18 per cent were applying for the second year this time. Because few students feel assured of a place in a medical school, most students apply to more than one medical school. Table 2 lists each medical school, the size of its freshman class, the number of its applicants and the total number of applications filed by its applicants.

In general, schools restricting their applicants to residents of their state have fewer applicants. Private medical schools have more applicants. The number of applicants alone, however, can be misleading because most applicants apply to more than one school. Thus, the medical schools are faced with the problem of the applicant who will not accept when offered a place, because he has gained an acceptance to another and more preferred school.

Table 2 this year, for the first time, shows not only the number of applicants for each medical school, but also the total number of applications filed by these applicants. One institution, for example, had 141 individuals apply for its 92 places (or 1.5 for each place). These 141 individuals filed a total of only 221 applications or only 80 applications in addition to the ones to this school. At another institution, there were 855 individuals who applied for the 73 available places (or 11.7 for each place). However, these 855 individuals filed a total of over 7,600 applications and no one except the applicant knows which medical school he preferred. In general the state medical schools have not only the fewest applicants but also their applicants make the smallest number of other applications. Com-

At the time this report was prepared, Mr. Stalnaker was director of studies of the AAMC.

Table 1 • The Number of Individuals Applying to Medical School for Each of the Past Eight Years, and the Total Number of Applications Filed

Freshman Year	Number of Applications	Number of Individuals	Applications per Individual
1947-48	56,279	18,829	3.0
1948-49	81,662	24,242	3.4
1949-50	88,244	24,434	3.6
1950-51	81,931	22,279	3.7
1951-52	70,678	19,920	3.5
1952-53	56,319	16,763	3.4
1953-54	48,586	14,678	3.3
1954-55	47,568	14,538	3.3

parisons among medical schools based on the figures published here can lead to false conclusions unless pertinent background information peculiar to each school is considered.

Of the total group of 14,538 applicants to all schools, 7,878, or 54 percent, were offered one or more acceptances. It should be recognized that not all applicants are suited by intelligence or temperament to survive the long and arduous period of training required to become a physician. Some of the applicants apply after three years of college and even those with proper qualifications may be asked to continue their undergraduate education for another year. Some of the applicant group (18 per cent this year) are reapplying and a smaller proportion of this group (38 per cent) were found acceptable, suggesting that the group contains, in addition to well qualified individuals, some who are persistent but less fitted for the study of medicine. Of the group of applicants applying for the first time, 58 per cent were accepted.

Great Variation

Variation among the individual schools is great. Because most schools seek the same type of highly qualified applicant, competition for able students continued at a high level. A few schools with geographic restrictions had to "scrape the bottom of the barrel" to get a freshman class this year, and no school had as many top-flight applicants as it desired.

The study of applicants was initiated many years ago by the Association. The study has been developed over the years, and this year more complete and detailed statistics are presented than ever before. The source of the basic information is the medical schools. The accuracy and completeness of the statistics depends upon the accuracy and completeness of the data supplied by the medical schools. This year the schools supplied almost 50,000 individual report cards, and checked the lists of their applicants compiled in the central office from their cards. A vote of appreciation is due the staffs of the medical schools who prepare the original reports and do the extensive checking so necessary to accurate reporting. This study is made possible by their efforts. Their continued friendly and understanding cooperation makes the work more pleasant and the results more significant.

Table 3 classifies the applicants by the number of applications made, and the action taken. Each year for the past several years about 40 per cent

Table 2 • Number of Completed Applications Acted Upon by Each Medical School and the Total Number of Applications Filed by these Applicants

	Size of Freshman Class	Applicants To Each Medical School			Total Applications Filled by Applicants to Each School	Average Number of Applications per Applicant
		Men	Women	Total		
Alabama	83	184	10	194	483	2.5
Albany	64	890	38	928	8200	8.8
Arkansas	92	135	6	141	221	1.6
Baylor	84	593	35	628	3930	6.3
Boston	72	847	61	908	7819	8.6
Bowman Gray	54	457	20	477	3864	8.1
Buffalo	79	493	22	515	4230	8.2
California, L.A.	50	354	27	381	2628	6.9
California, S.F.	76	356	34	390	2578	6.6
Chicago Medical	73	820	35	855	7680	9.0
Chicago, Univ. of	72	652	35	687	6057	8.8
Cincinnati	90	677	25	702	5104	7.3
Colorado	86	155	13	168	280	1.7
Columbia P & S	120	1400	114	1514	11184	7.4
Cornell	82	1226	89	1315	10091	7.7
Creighton	76	597	24	621	4479	7.2
Dartmouth	24	223	3	226	2085	9.2
Duke	77	546	27	573	4129	7.2
Emory	75	532	22	554	3431	6.2
Georgetown	108	789	49	838	6895	8.2
George Washington	102	852	30	882	6997	7.9
Georgia	103	202	6	208	426	2.0
Hahnemann	107	1070	54	1124	8504	7.6
Harvard	115	1062	77	1139	7517	6.6
Howard	74	412	32	444	1954	4.4
Illinois	166	460	32	492	1898	3.9
Indiana	152	369	18	387	1489	3.8
Iowa	120	138	6	144	236	1.6
Jefferson	175	1838	1	1839	12196	6.6
Johns Hopkins	79	379	35	414	3012	7.3
Kansas	101	281	19	300	1444	4.8
Louisiana	124	289	24	313	1305	4.2
Louisville	102	195	17	212	753	3.6
Loyola (Stritch)	89	667	24	691	4569	6.6
Marquette	102	829	47	876	5746	6.6
Maryland	83	315	16	331	2200	6.6

(Table 2 cont'd)

Medical Evangelists	98	176	11	187	336	1.8
Meharry	72	408	24	432	1227	2.8
Miami	68	135	8	143	521	3.6
Michigan	204	464	48	512	2012	3.9
Minnesota	126	282	16	298	1271	4.3
Mississippi	57	127	4	131	198	1.5
Missouri	45	113	5	118	393	3.3
Nebraska	86	201	8	209	643	3.1
New York Medical	129	1683	108	1791	13432	7.5
New York University	137	1295	92	1387	11323	8.2
North Carolina	69	208	9	217	832	3.8
North Dakota	42	131	2	133	663	5.0
Northwestern	130	1505	72	1577	10594	6.7
Ohio State	151	399	16	415	1533	3.7
Oklahoma	96	187	6	193	573	3.0
Oregon	78	288	22	310	1884	6.1
Pennsylvania	130	1571	88	1659	12095	7.3
Pittsburgh	97	555	23	578	3400	5.9
Rochester	72	782	39	821	7147	8.7
St. Louis	120	980	30	1010	7275	7.2
South Carolina	79	130	4	134	229	1.7
South Dakota	35	156	7	163	1150	7.1
Southern California	69	434	24	458	3406	7.4
Southwestern	105	310	24	334	795	2.4
Stanford	60	421	32	453	3418	7.5
State U. of N.Y. (N.Y.)	151	1162	82	1244	9716	7.8
State U. of N.Y. (Syracuse)	76	713	35	748	6424	8.6
Temple	130	1538	83	1621	11524	7.1
Tennessee	205	353	25	378	957	2.5
Texas	164	411	29	440	1010	2.3
Tufts	112	527	45	572	3733	6.5
Tulane	137	806	41	847	5742	6.8
Utah	55	270	13	283	1798	6.4
Vanderbilt	54	652	32	684	5371	7.9
Vermont	50	221	21	242	1751	7.2
Virginia, Med. Coll. of	84	305	16	321	1779	5.5
Virginia, Univ. of	76	384	17	401	2844	7.1
Washington (St. Louis)	87	1057	52	1109	8129	7.3
Washington, Univ. of	75	328	22	350	1987	5.7
Wayne	75	272	24	296	872	2.9
Western Reserve	84	839	57	896	6268	7.0
West Virginia	31	86	2	88	241	2.7
Wisconsin	82	151	16	167	455	2.7
Woman's Medical	51	2	137	159	834	5.2
Yale	79	603	45	648	5221	8.1
TOTAL	7549	44905	2663	47568		

Table 3 • Applicants Classified by Number of Applications Made and Action Taken

Number of Applications Made	One or More Acceptances			No Acceptances			Total		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
1.....	2629	170	2799	2884	195	3079	5513	365	5878
2.....	1238	86	1324	959	68	1027	2197	154	2351
3.....	975	65	1040	589	56	645	1564	121	1685
4.....	770	45	815	452	33	485	1222	78	1300
5.....	535	41	576	317	27	344	852	68	920
6.....	344	26	370	236	17	253	580	43	623
7.....	258	12	270	176	8	184	434	20	454
8.....	162	10	172	138	4	142	300	14	314
9.....	132	6	138	101	1	102	233	7	240
10-14.....	262	9	271	265	13	278	527	22	549
15-19.....	70	3	73	82	1	83	152	4	156
20-24.....	17	0	17	23	—	23	40	—	40
25-29.....	5	0	5	11	—	11	16	—	16
30-34.....	4	3	7	1	—	1	5	3	8
35-45.....	1	0	1	3	—	3	4	—	4
TOTAL.....	7402	476	7878	6237	423	6660	13639	899	14538

of the applicants applied to single schools, and again this year some 40 per cent of all applicants filed a single application. This group includes those students who have good reason to believe they will be accepted by the one medical school to which they apply and also those students who cannot go to medical school unless their state institution accepts them. Of this group, a smaller proportion (48 per cent) are accepted than for those making more applications. Of the group making application to two medical schools, 56 per cent are accepted, but of those who apply to three schools, 62 per cent gain admission. It almost seems as if the more medical schools one applies to, the more likely one is to be admitted. Of the four hardy and ambitious souls, each of whom applied to 35 or more medical schools,

Table 4 • Mean Score on the Medical College Admissions Test of Applicants Making Various Numbers of Applications

Number of Applications	Group Receiving One or More Acceptances				Group Not Accepted by Any School			
	Verbal	Quant.	Med. Soc.	Science	Verbal	Quant.	Med. Soc.	Science
1.....	501	516	519	517	451	453	468	451
2.....	510	518	524	529	447	448	466	446
3.....	520	522	529	541	455	454	471	459
4.....	528	526	537	545	459	455	471	460
5.....	538	531	545	554	461	459	474	471
6.....	532	523	536	546	467	465	489	480
7.....	535	532	545	552	465	463	484	479
8.....	554	530	557	548	479	463	488	478
9.....	541	527	546	552	490	486	509	491
10-14.....	533	512	547	545	488	472	505	487
15-19.....	533	515	543	539	474	455	490	481
20-24.....	551	528	567	549	507	495	535	496
25-29.....	475	491	521	489	455	467	482	480
30-34.....	591	498	589	559	505	465	485	425
35-45.....	535	445	635	415	398	478	458	438
TOTAL.....	517	521	530	533	457	455	473	459

Table 5 • Applicants Who Also Applied Last Year Classified by Number of Applications Made and Action Taken

Number of Applications Made	One or More Acceptances			No Acceptances			Total		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
1	358	23	381	677	48	725	1035	71	1106
2	146	12	158	266	21	287	412	33	445
3	108	8	116	142	10	152	250	18	268
4	70	1	71	106	5	111	176	6	182
5	57	2	59	78	6	84	135	8	143
6	41	2	43	57	3	60	98	5	103
7	39	1	40	42	4	46	81	5	86
8	24	1	25	34	1	35	58	2	60
9	27	0	27	32	1	33	59	1	60
10-14	45	2	47	65	6	71	110	8	118
15-19	18	0	18	26	0	26	44	0	44
20-24	7	0	7	8	0	8	15	0	15
25-29	2	0	2	5	0	5	7	0	7
30-34	0	3	3	0	0	0	0	3	3
35-45	1	0	1	2	0	2	3	0	3
TOTAL	943	55	998	1540	105	1645	2483	160	2643

only one was accepted.

About two thirds of the applicants limit themselves to one, two or three applications each, and about 52 per cent of this group gains acceptance. On the other hand, 773 individuals each filed 10 or more applications, and these individuals account for over 10,000 applications, each one to be processed by a medical school. About 48 per cent of this group was accepted.

Over the past five years, the proportion of applicants accepted has run from 33 per cent in 1950-51 to 46 per cent in 1952-53 to 54 per cent in 1954-55.

Almost all applicants now take the Medical College Admission Test. This test has scores in each of the following areas: verbal, quantitative, un-

Table 6 • Mean Score on the Medical College Admission Test of Applicants Who Applied Last Year

Number of Applications Made	One or More Acceptances				No Acceptances			
	Verbal	Quant.	Mod. Soc.	Science	Verbal	Quant.	Mod. Soc.	Science
1	492	504	507	501	451	445	469	451
2	489	500	500	514	447	438	460	441
3	508	507	522	527	454	442	471	457
4	479	484	495	491	455	441	467	457
5	501	517	518	526	456	454	471	461
6	513	495	521	526	446	457	489	477
7	491	503	521	513	463	466	481	475
8	556	522	565	541	462	448	477	489
9	495	500	517	535	478	486	492	468
10-14	524	511	537	531	473	455	489	477
15-19	526	525	533	549	458	446	477	461
20-24	541	536	546	541	477	507	524	513
25-29	470	460	550	525	449	477	495	485
30-34	625	488	575	602	—	—	—	—
35-39	535	445	635	415	—	—	—	—
40-44	—	—	—	—	385	475	455	415
TOTAL	499	504	513	513	453	447	471	456

Table 7 • Number of Individuals Accepted Classified by the Number of Medical Schools Offering Them an Acceptance

Acceptances	Also Applied Last Year			Others			Total		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
1.....	780	47	827	4801	309	5110	5581	356	5937
2.....	120	7	127	1225	84	1309	1345	91	1436
3.....	32	1	33	340	20	360	372	21	393
4.....	9	—	9	72	7	79	81	7	88
5.....	2	—	2	15	1	16	17	1	18
6.....	—	—	—	5	—	5	5	—	5
9.....	—	—	—	1	—	1	1	—	1
TOTAL.....	943	55	998	6459	421	6880	7402	476	7878

derstanding modern society, and science. Scores were available for 91 per cent of all applicants. For the students who were accepted, test scores were available for 96 per cent and for 85 per cent of those not accepted.

Table 4 gives average scores for each section of the test for various groups of applicants. The average score for the accepted group is about 525 and for the not-accepted group about 461 or 64 score-points lower.

Again, it can be observed that the students who make a single application and are accepted score lower than those who make three applications and are accepted! The explanation is that probably the single-applicant group is largely applying to medical schools of low tuition and geographic restriction to state residents. These schools are forced to accept lower-standing students than schools which have no restrictions.

Table 5 is restricted to the students who are reapplying this year. This group contains some very able students who took a "flyer" a year earlier and some who may have been admitted but decided to continue for another year. Also are included some applicants found unqualified who continue to hope for admission. A smaller proportion of this reapplying group is accepted: 38 per cent compared with 58 per cent of the group applying for the first time. The repeat group constitutes 18 per cent of the total group of applicants.

Table 6 gives the mean scores on the Medical College Admission Test

Table 8 • Scores on Medical College Admission Test of Applicants Receiving the Number of Acceptances Indicated

Number of Acceptances	*Number of Applicants	Mean Scores on the M. C. A. T.			
		Verbal	Quant.	Mod. Soc.	Science
1.....	5594	507	513	521	523
2.....	1430	540	539	550	558
3.....	393	560	549	562	581
4.....	86	576	554	574	588
5.....	18	553	533	579	574
6.....	5	571	573	609	595
9.....	1	595	575	555	575
TOTAL.....	7527	517	521	530	533

*Number for whom test data were available

Table 9 • Number of Individuals from Each State Applying to One or More Medical Schools

	One or More Acceptances			Not Accepted				Total Number of Applications
	Men	Women	Total	Men	Women	Total	Total	
Alabama	124	9	133	104	4	108	241	538
Arizona	31	1	32	22	1	23	55	185
Arkansas	105	7	112	39	1	40	152	230
California	405	24	429	427	35	462	891	4026
Canada	7	1	8	42	3	45	53	132
Colorado	85	9	94	48	5	53	147	202
Connecticut	105	9	114	99	10	109	223	1038
Delaware	8	0	8	12	0	12	20	69
District of Columbia	33	9	42	66	11	77	119	394
Florida	167	7	174	103	8	111	285	887
Foreign	66	14	80	111	17	128	208	748
Georgia	149	4	153	117	3	120	273	516
Idaho	24	4	28	14	1	15	43	171
Illinois	350	21	371	277	18	295	666	2001
Indiana	187	7	194	131	8	139	333	658
Iowa	126	7	133	35	3	38	171	261
Kansas	100	8	108	66	3	69	177	295
Kentucky	107	8	115	50	2	52	167	316
Louisiana	147	14	161	92	5	97	258	419
Maine	29	1	30	15	2	17	47	186
Maryland	116	8	124	75	5	80	204	519
Massachusetts	218	18	236	182	17	199	435	2059
Michigan	273	17	290	179	22	201	491	1176
Minnesota	151	6	157	73	2	75	232	458
Mississippi	118	8	126	91	3	94	220	380
Missouri	135	7	142	76	3	79	221	623
Montana	22	0	22	17	3	20	42	164
Nebraska	112	3	115	62	3	65	180	292
Nevada	3	0	3	1	0	1	4	10
New Hampshire	16	1	17	14	1	15	32	83
New Jersey	250	21	271	317	12	329	600	3305
New Mexico	26	0	26	9	2	11	37	76
New York	955	62	1017	1097	94	1191	2208	11655
North Carolina	141	11	152	111	6	117	269	609
North Dakota	40	0	40	21	1	22	62	107
Ohio	377	25	402	290	19	309	711	2260
Oklahoma	124	5	129	63	1	64	193	377
Oregon	67	1	68	53	2	55	123	315
Pennsylvania	569	39	608	628	26	654	1262	4374
Rhode Island	33	3	36	39	1	40	76	375
South Carolina	95	3	98	60	4	64	162	272
South Dakota	43	2	45	18	0	18	63	125
Tennessee	169	10	179	42	1	43	222	334
Texas	341	23	364	243	18	261	625	1299
U. S. Territories & Poss.	36	5	41	99	14	113	154	479
Utah	69	2	71	54	2	56	127	409
Vermont	30	4	34	8	0	8	42	72
Virginia	173	8	181	110	7	117	298	598
Washington	100	5	105	72	6	78	183	508
West Virginia	64	1	65	56	2	58	123	317
Wisconsin	156	13	169	69	3	72	241	447
Wyoming	12	0	12	12	0	12	24	63
Not Stated	13	1	14	126	3	129	143	156
TOTALS	7402	476	7878	6237	423	6660	14538	47568

for the group reported in Table 5. In the main, as has been true in previous years, these averages are lower than the average of the group applying for the first time.

Some students seek to gather as many acceptances as possible, while others notify the schools to which they have applied as soon as they receive an acceptance. Table 7 shows the number of acceptances received by the group. The 7,878 students accepted had a total of 10,469 acceptances, one student receiving an acceptance from nine medical schools.

Table 8 shows that in general the group receiving more acceptances (up to four) are higher on the tests. The group receiving more than four acceptances is too small to make the averages meaningful.

Table 9 divides the applicants according to the state of residence, and indicates the number accepted from each state. Again this year about half the applicants (6,963) come from seven states. These states are, in order of number of applicants: New York, Pennsylvania, California, Ohio, Illinois, Texas and New Jersey. These states supplied 44 per cent of all students who were accepted. From New York alone, there were 2,208 applicants—15 per cent of all applicants and 13 per cent of the accepted applicants.

Of the states supplying 100 or more applicants, New Jersey has the lowest acceptance rate, (and at the time of this report it had no medical school), and New York had the second lowest proportion of acceptance. The highest rate of acceptances was for Tennessee, with Iowa second.

RATIO OF APPLICANTS TO POPULATION

With most government-controlled medical schools limiting their students to a large extent to residents of their jurisdiction, there is value in compiling statistics about the medical school applicants in relation to state population. The basic data here reported were obtained from the 1954 applicant study, the 1950 A.M.A. Directory, the 1950 census reports, and from records maintained by the AAMC.

From Table 1, it may be noted that 10 of our states have no medical school. New Jersey is the outstanding state without a medical school, and a private school is now being started in that state. New Jersey, from the figures available, would appear to be able to support several medical schools. It has a large population, adequate wealth, sufficient students and large population centers with adequate clinical material.

The first four columns of Table 1 give data on the availability of medical education in each state: 16 states have no government-controlled medical schools, including the 10 states which offer no medical education. State or municipal medical schools are found in 33 states, and in 20 of these states the government medical school is the only one. Six states have only private medical schools.

The freshman places in medical school available within a state range from none in the 10 states without medical education to 37 per 100,000 in the District of Columbia, a small geographic area, with three medical schools. Vermont has 13 places in its

Table 1 • Medical School Applicants and Freshman Places Available per State Population, 1954-55

	1	2	3	4	5	6	7	8
	No. of Medical Schools	Freshmen per 100,000 Pop.	Freshmen from Same State per 100,000 Pop.	Per Cent from Same State	Applicants per 100,000 Pop.	Accepted per 100,000 Pop.	Per Cent Accepted	MD's per 10,000 Pop.
Alabama	1	3	3	100	8	4	55	7
*Arizona	—	—	—	—	7	4	58	11
Arkansas	1	5	5	100	8	6	74	9
California	5	3	3	80	8	4	48	16
Colorado	1	6	5	75	11	7	64	16
*Connecticut	1	4	1	14	11	6	51	16
*Delaware	—	—	—	—	6	2	40	13
*D. of Columbia	3	37	6	15	15	5	35	31
*Florida	1	3	3	100	10	6	61	11
Georgia	2	4	3	74	8	4	56	9
*Idaho	—	—	—	—	7	5	65	8
Illinois	5	6	3	53	8	4	56	15
Indiana	1	4	4	97	8	5	58	11
Iowa	1	5	4	93	7	5	78	11
Kansas	1	6	5	87	9	6	61	11
Kentucky	1	3	3	82	6	4	69	9
Louisiana	2	10	6	60	10	6	62	11
*Maine	—	—	—	—	5	3	64	11
Maryland	2	8	4	47	9	5	61	15
*Massachusetts	3	6	2	37	9	5	54	19
Michigan	2	5	4	92	8	5	59	11
Minnesota	1	4	4	92	8	5	68	14
Mississippi	1	3	3	100	10	6	57	7
Missouri	3	6	3	45	6	4	64	13
*Montana	—	—	—	—	7	4	52	9
Nebraska	2	12	8	64	14	9	64	12
*Nevada	—	—	—	—	2	2	75	12
*New Hampshire	1	5	0	0	6	3	53	14
*New Jersey	—	—	—	—	12	6	45	13
*New Mexico	—	—	—	—	5	4	70	7
New York	9	6	4	70	15	7	46	20
North Carolina	3	5	3	59	7	4	56	8
North Dakota	1	6	6	90	10	6	64	8
Ohio	3	4	3	71	9	5	56	12
Oklahoma	1	4	4	100	9	6	67	10
Oregon	1	5	4	83	8	4	55	12
*Pennsylvania	6	7	5	75	12	6	48	14
*Rhode Island	—	—	—	—	10	5	47	13
South Carolina	1	4	4	100	8	5	60	7
South Dakota	1	5	4	88	10	7	71	8
Tennessee	3	10	4	44	7	5	81	9
Texas	3	5	4	89	8	5	58	10
Utah	1	8	6	75	18	10	56	12
Vermont	1	13	8	60	11	9	81	15
Virginia	2	5	4	81	9	5	61	10
Washington	1	3	3	87	8	4	57	11
West Virginia	1	2	2	100	6	3	53	9
Wisconsin	2	5	3	64	7	5	70	11
*Wyoming	—	—	—	—	8	4	50	8
Average or Total	81	5	3	69	10	5	54	13

*No state or municipal medical school.

Table 2 • States Tabulated According to Per Cent of Accepted Applicants and Type of Medical Schools in the State

Type of Medical School in State	Per Cent of Applicants Accepted						
	35% to 45%	46% to 56%	57% to 62%	63% to 68%	69% to 74%	75% to 81%	Total
Government and private	0	6*	3	2	1	1	13
Government only	0	4	7	4	3	2	20
Private only	1	4	1	0	0	0	6
No medical school	2	3	1	2	1	1	10
Total number of states	3	17	12	8	5	4	49

*Six states have from 46 per cent to 56 per cent of their applicants to medical school accepted, and these six states each have both government and private medical schools.

freshman medical class per 100,000 population. New York, although it had nine medical schools at the time of this study, still had only six freshman places per 100,000 population. These figures should not be interpreted to indicate that places in the freshman class are reserved for residents of the state. All independent and some state-controlled medical schools accept out-of-state students.

The relative position of the states remains consistent with the order reported in earlier studies. There is again an over-all decrease in the number of applicants, amounting to about one per 100,000 population for the country as a whole. The largest proportional applicant decreases are for Delaware and Nevada. Eight states increased: Georgia, Louisiana, New Mexico, South Carolina, South Dakota, Utah, Vermont and Virginia. Eleven other states held to their earlier level in contrast to the general national decrease.

Wherever there are medical schools within a state, a larger proportion of the applicants tend to be accepted. Table 2 gives the evidence. Two states have less than 45 per cent of their applicants accepted by any medical school, and neither of these states has a state medical school. At the other extreme there are 23 states having at least 60 per cent of their applicants accepted. The national average for the class under study here is 54 per cent.

Relationship Apparent

From Table 3 it appears that there is a relationship, although not a perfect one, between the relative availability of medical education and the

Table 3 • States Tabulated According to Applicants per 100,000 Population and Freshman Places Available in State per 100,000 Population

Freshmen Places Available in States per 100,000 Population	Applicants Per 100,000 Population				
	2-7	8-9	10-11	12-19	Total
7-37	1*	1	2	4	8
5- 6	5	7	3	1	16
1- 4	2	10	3	0	15
None	7	1	1	1	10
Total	15	19	9	6	49

*One state has 2 to 7 applicants per 100,000 population and has from 7 to 37 places available in the freshman class of medical schools.

Table 4 • States Tabulated According to Applicants per 100,000 Population and MD's per 10,000 Population

MD's Per 10,000 Population	Applicants Per 100,000 Population				
	2-7	8-9	10-11	12-19	Total
14-31	1	5	3	3*	12
12-13	3	2	1	3	9
10-11	4	7	2	0	13
7- 9	7	5	3	0	15
Total number of states	15	19	9	6	49

*Three states have 12-19 applicants to medical school per 100,000 population and these three states also have 14-31 MD's per 10,000 population.

relative number applying. In six states having 12 or more applicants per 100,000 population, five are states in which medical education is more available relative to the population of the state.

There also appears to be a relationship between the relative number of doctors in a state and the relative number of students who apply to medical school from that state. Table 4 gives the data.

Caution must be exercised in drawing conclusions from the data presented. No information on the quality of medical education is available. Where the students of a given medical school eventually practice is not considered.

Integration of Clinical and Preclinical Studies

I. DAVIDSOHN

IT IS common practice to begin the discussion of a subject with definitions, in order to make certain that the terms used mean the same to the speaker and the audience. The second half of the preceding statement (the understanding of what the term implies) is more important than the first (formal description of a term.) It is easier to arrive at; it is, as a rule, less controversial and less likely to provoke resistance or even hostility.

The title of this presentation is a case in point. The word "integration" means different things to different people. I gathered from reading the report of the First Teaching Institute that, at first, the word "integration" was looked at askance because it suggested regimentation and had other distasteful connotations. Slowly, and particularly during the 1954 Institute, it began to be used in a broader sense as more or less synonymous with correlation, to indicate bringing together teachers of various disciplines, preclinical and clinical, to integrate and correlate the subject matter without disturbing the individuality, independence and integrity of the respective departments, as administrative, investigative and educational units. It is in this sense that the terms "integration" and "correlation" will be used in this presentation.

What is integration? Does it mean throwing together of things which are separated naturally or artificially?

As I see it, integration in undergraduate medical education means bringing together, for purposes of study and comprehension, aspects of a subject which we have been accustomed to separate artificially for purposes of research. The analytical method is the natural process for accumulating knowledge.

Let us take the liver as an example. If I had the time to present the history of how our knowledge of this organ has developed, I could show how the knowledge of normal anatomy, histology, embryology, physiology, gross pathologic anatomy, histopathology, pathologic physiology, histochemistry, etc., have been developed by different investigators at different times. This is true for all biological investigation. Having become used to this approach in research, we have been using a similar approach in teaching and we take it for granted that this is as it should be. Actually, the opposite way is more natural. Useful and essential as the process of breaking up of the whole into small

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parcels may be for investigation and research, the learning of what is known is greatly facilitated by putting it all together. One could go even farther and state that what we call liver as we see it on a tray, a structure of a certain size and shape, with definite gross, microscopic, chemical and other characteristics, is an artifact; that to comprehend it fully in health and disease, it must be considered in relation to the rest of the body: the circulation, the influences exerted by it on the other organs, and, in turn, being exerted upon it by the rest of the body. That is what integration implied to me.

On Teaching Systems

In any consideration of teaching systems, the consensus is that the teacher is the main factor. Bring together a good teacher and a good pupil and the result will be that the pupil will be transformed into a student, an individual desirous of learning and seeking it. A good teacher is a man who not only knows himself what he is talking about, but who has the ability to tell it so that the others know what he is talking about.

He is not expected to serve his students an intellectual fare of ready prepared dishes, but to offer them a few basic recipes and a key or two which will enable them to find all they are capable of using. It is not good style to use the colloquial expression that a good teacher "learns" his students, but it expresses what we think he should do. This is what happens when the good teacher and the good student get together.

The third essential factor in the educational process is time. It is always limited, and as the quantity and complexity of medical knowledge is constantly on the increase, the available time shrinks in proportion. Furthermore, not all those holding jobs as teachers *are* good teachers, and not all pupils have all the ingredients needed to transform them into good students. That is why we are constantly on the lookout for better educational systems.

That is the main reason for the interest in correlation and integration in medical education. We hope to compensate for deficiencies in one or more of the four factors which are the essential ingredients of education: the teacher, student, time and subject. They are listed in what seems to me to be the order of their relative importance. They are interdependent and compensate for each other, but only within certain limits. No matter how large and complex the subject, given a good teacher, a good student and enough time, the task can be accomplished.

The fact that time is getting shorter all along in proportion to knowledge adds attractiveness and urgency to experiments in medical education. It stands to reason that with the amount of knowledgeable material increasing, time available remaining about the same and further improvement in the selection of students not likely, the main factor that we will have to deal with in order to improve performance will be the teacher.

This is the area where much responsibility rests on those who guide the destinies of our schools: the deans. They will have to pay more than lip service to the indubitable fact that a teacher must enjoy teaching to be successful and that research, important as it is, is only one of the functions of a medical school.

The aim of integration in medical education is not to offer the student a predigested unified concept in a single well-wrapped package of knowledge. Its aim is to compensate for deficiency in time and to simplify

the job of learning. It must be recognized that at the same time the job of teaching is made more difficult, more complex and more expensive.

There are certain connotations in integrated and correlated teaching which must be kept in mind and avoided in order not to kill the goose that lays the golden egg. For instance, to emphasize what was already stated, integration of teaching must not encroach upon administrative, investigative and even educational independence of departments. Integrated teaching must be based on cooperation and not on coordination.

We are all watching with keen interest the educational experiments in several schools. We will all learn from their experience. The consensus at the Institute was that it will be best to wait and see what they will accomplish before imitating, no matter how tempting the prospects may be. This does not mean that other experiments should not be tried. Whatever the results, it is well to keep in mind that not every experimental approach is applicable to each school and that local conditions will have a determining influence on which approach is best suited. Integration is not a cure-all. It is safe to state that, also, there is limit to useful integration, beyond which the result may be disintegration of certain achievements and standards which it took decades to develop.

The process of integrated teaching is not in conflict with the tendency to separate some divisions from departments, such as bacteriology from pathology. Neither is the need for integration or correlation of bacteriology in the two departments necessarily an indication that the separation was unnecessary. Departments of medicine and pediatrics are particularly suitable for integrated teaching of preclinical and clinical subjects.

There is general consensus that autopsies and preclinical-clinical conferences are the best media for correlated teaching, but only if the educational environment is such that all component parts (departments and divisions) needed for integration are ready and generous with their time. This type of integration illustrates, better than volumes could do, that the study of medicine is the study of disease in a person afflicted with it and not merely the study of pathological changes in an organ.

The advantages of correlated and integrated teaching are:

1. It saves the student's time and enables him to learn more in less time.

2. It presents the subject matter in a manner which is more in keeping with what disease processes are. Diseases as they exist are correlated and integrated processes and phenomena. For example, an infarct of the myocardium is made up of the heart muscle, thrombosed arteriosclerotic coronary artery, necrotic myocardial fibers, leukocytic infiltration, accelerated sedimentation rate of red cells, leukocytosis, lowered blood pressure, precordial pain, pericardial friction rub, abnormal electrocardiogram, recommended treatment, etc., all in one.

If we break up the phenomenon into its components and teach each or several, independently, in the corresponding five or six departments (anatomy, histology, physiology, pathology, clinical pathology, medicine) instead of teaching it all in a correlated or integrated course in which the contributions of the various departments are brought together chronologically and topographically, in varying degrees, then the relative simplicity of correlated teaching stands out sharply.

3. The participation of the depart-

ments in the joint effort eliminates or reduces the competition for the students' time and reduces repetition. It is worth stating that elimination or even excessive reduction of repetition may not be as desirable as it appears at first. For every student who does not need repetition, there are dozens who are benefited by it. It is an essential part of the learning process. Repetitiousness is bad; repetition, especially planned, is useful.

4. Correlated teaching enhances motivation by bringing to the student what he is, as a rule, most vitally interested in: the clinical problem.

The following main disadvantages have been pointed out: Correlated teaching consumes more of the teacher's time, mainly by breaking up his contributions into smaller parcels. The teaching schedule is of necessity less controllable. This is the price that has to be paid for adding to the student's free time. The change from the current teaching system is frequently causing dissatisfaction in the involved departments. This is to be expected but, as a rule, it should not be a serious or permanent hindrance.

Degrees of Correlation

Correlation within a department. The need for this type of correlation and integration is obvious. It includes correlation between the lecture, the gross pathologic demonstration, the study of histologic slides in the laboratory. Correlation on this level must be achieved before the other levels are tried.

Correlation with other basic medical sciences. This is sometimes referred to as horizontal correlation. Much can be done on this level by the mere expedient of meetings of instructors, of knowing what is being done in the other departments. Various attempts at integration of "block" or "concentration" courses vs. "distributed" or "wedge type" scheduling have been studied, but thus far no definitive conclusions seem possible. Both systems have their advocates. It is obvious that "juxtaposition" of courses by itself is not correlation.

Vertical correlation, oriented mainly in the direction of introducing a clinical flavor into preclinical work and, vice versa, of continuing the basic science influence through the clinical years.

The importance of both types of efforts seems generally appreciated. The main value of adding a clinical touch is that it contributes considerably to the students' motivation and makes basic sciences more meaningful.

Courses in pathology are well provided with this type of correlation by the very nature of the subject and by the role which autopsies play in these courses.

The bringing of basic medical sciences into the teaching of clinical subjects exerts a most desirable influence. It helps to maintain the benefits derived during preclinical studies and it adds to better understanding of clinical problems. This is especially noticeable in the area of clinical pathology, which should, according to many participants, be a collaborative effort begun in the second year, continued during the clinical years and participated in by preclinical and clinical departments.

Some Results of the Cancer Teaching Program

RAYMOND F. KAISER

THE Public Health Service program of grants to medical schools to coordinate the teaching of cancer has completed its seventh year. The program, administered by the National Cancer Institute, has been expanded since its beginning in June 1947 until 82 of the nation's medical schools are currently participating.

The basis of the institute's cancer teaching program was a conference report entitled "Cancer in the Medical School Curriculum," published in August 1947 by the National Advisory Council, which recommended financial assistance to medical schools prepared to undertake an integrated cancer teaching program. It summarized the findings of a conference at the National Cancer Institute in 1946, attended by deans and professors from a number of medical schools, and representatives of the National Research Council, the American Cancer Society, the National Advisory Cancer Council, and other units of the Public Health Service.

"Cancer in the Medical School Curriculum" helped formulate the objectives of the program essentially as follows: 1. development of an awareness of cancer among medical students; 2. effective utilization of current knowledge to supplement gaps in the students' information on cancer; 3. reduced emphasis in class instruction on the incurability of cancer; 4. coordination of cancer teaching in any manner which would provide the student, at some time during the course of his studies, with a comprehensive concept of the disease; 5. emphasis on the need for group presentation and consultation in the discovery, diagnosis and treatment of cancer; 6. stimulation of student interest in cancer research; 7. increased participation of the internist in cancer teaching; and 8. improvement of medical service to cancer patients.

It was obvious from the beginning that effective methods of coordinating the teaching of cancer would vary from school to school. The National Cancer Institute had no desire to suggest a uniform instruction plan to all participating institutions. It was decided then that each school should have an opportunity to develop the type of teaching program best adapted to its particular method and philosophy of medical training and most suited to its personnel and available facilities. Moreover, allocation of grant funds was left, as far as possible, to the discretion of participating schools with the reservation that these

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funds should not be used to replace existing budgetary commitments or to underwrite specific research projects.

Since this is by nature a long-range program, it was clear when the project was introduced that continuity was essential, and the Institute has provided all possible assurance of continuity. All approved medical schools are considered eligible for grant funds. In 1947, the National Advisory Cancer Council recommended a maximum of $25,000 annually for each four-year medical school and $5,000 annually for each two-year school. These amounts have remained the same throughout the program.

The extent of participation for the 82 medical schools in the country receiving funds under this grant program is as follows:

1. Forty-six schools are in the seventh year of participation.
2. Twenty-six schools are in the sixth year of participation.
3. Four schools are in the fifth year of participation.
4. Two schools are in the fourth year of participation.
5. One school is in the third year of participation.
6. Three schools are in the first year of participation.

When the program was begun, one of the council's recommendations was for a review by the dean and faculty of each medical school of cancer teaching methods then practiced in their own institutions. These reviews indicated that with very few exceptions the following conditions prevailed:

1. There was duplication in teaching some facets of the subject.
2. Some aspects of cancer were incompletely covered in the course of instruction and others were entirely omitted.
3. In some instances, conflicting information was presented on the same phase of the subject by different departments.
4. Only ordinary emphasis was given to cancer in the routine instruction.
5. There was little systematized cancer instruction.
6. Cancer teaching consisted almost entirely of individual departmental courses of instruction. Definite correlation in an over-all curriculum was lacking.
7. Minimal opportunity was provided for the student to learn the natural history or course of the disease.
8. Most of the teaching was didactic in nature with minimal opportunities for clinical instruction.
9. An inadequate number of instructors and faculty members were actively interested in cancer teaching.
10. No organized body or specific individual was available to integrate cancer teaching.

Cancer Coordinator

A project which might be described as an experimental program in cancer education was established in the medical schools as a result of these survey findings. It was recognized that considerable integration would be necessary to realize the purpose of the program. The establishment of a position variously titled but essentially that of "coordinator of cancer teaching" was found to be the best method of accomplishing the desired integration. Each participating school designated a staff member to serve as coordinator. In some schools this individual was already a member of the faculty. In many cases, however, it was necessary to recruit qualified individuals from outside. At present there are 39 surgeons, 22 pathologists, 10 radiologists, six internists, one gynecologist, one dermatologist, one urologist, one bacteriologist and one

dean serving as cancer coordinators.

It is interesting to note that 53 of the individuals initially designated as cancer coordinators have served in this capacity throughout the duration of the grant program. In the remaining schools, there have been one or more changes in this position. One reason for changes has been increased capability on the part of coordinators. In one school which has had three changes, one former coordinator became director of a large state cancer hospital, another was named chief of surgery at a recently established city cancer hospital, and a third has gone to another university to become associate professor of surgery and director of the tumor clinic. While there has been a good deal of turnover in some of these positions, it is believed that this is an index of the worthwhile nature of the grants, in that they afford the schools an opportunity to recruit qualified men to their faculties.

Establishment of cancer coordinator positions has been one of the most potent program factors in improving the quality of cancer teaching. In fact, the threat of a new and separate department of cancer teaching has led various departments in some schools to make a determined effort to improve the quality of their instruction in order to keep the subject in their curricula. Three schools have established separate departments of oncology and three others have formed divisions of oncology. The remaining schools have established a variety of administrative arrangements to stimulate the integration of cancer teaching.

The mere existence of a coordinator and the availability of grant funds has served as a stimulus to focus the attention of the medical school faculty on the cancer problem. This, in turn, has led to the establishment in the schools of cancer committees whose membership includes heads of major services and departments and such other officials as individual schools find appropriate. Initially, these committees tended to be composed of representatives of the clinical departments. However, as time went on, representatives of the preclinical departments were included. As the usefulness of the committees became apparent, more schools adopted the idea, and cancer committees are currently found in all participating schools. These committees, operating through interdepartmental cooperation, have been one of the most effective means of bringing about the integration of cancer teaching.

Practically all the institutions have come to consider a teaching tumor clinic essential to cancer instruction. At the beginning of the program, 43 of the schools had tumor clinics. But in most cases the clinics were operated as staff or service functions with a limited number of patients, inadequate follow-up procedures and little or no student participation. Under the grant program, these schools have expanded and improved their general tumor clinics and some special departmental tumor clinics, as well. The grant program has also been instrumental in motivating the establishment, since its inception, of tumor clinics in 30 additional schools. All these clinics are currently operating as teaching clinics with active student participation required. A tremendous increase in the student's contact with clinical material, and improved services to cancer patients have resulted from these practices.

Hand-in-hand with increased clinical facilities has gone an increase in the number of teaching tumor conferences or tumor board presenta-

tions. This method of teaching has been initiated in 43 of the schools since the program began. Tumor conferences already existing in 20 schools have been strengthened and expanded during the same period. All the tumor conferences are operated as teaching sessions with active student participation.

Increased Teaching Hours

Although it would be misleading to attempt to evaluate the effect of the teaching grants in terms of additional hours in the curriculum devoted to cancer instruction, it is noteworthy that all participating schools have in fact increased their cancer teaching hours. In general, this has been accomplished through a rearrangement of hours of instruction, revision in content of the material taught, elimination of needless repetition, the addition of material previously omitted and increased emphasis on cancer in existing departmental instruction. Increased emphasis on cancer instruction in pathology was reported by 68 schools, in radiology by 43, in surgery by 41, in gynecology by 28, in medicine by 24, in biochemistry by 18, in anatomy by 12, in dermatology by eight, in physiology by seven, and in ophthalmology and otolaryngology by five.

The fact that 52 schools have added one or more new cancer courses to the curriculum is of special interest. In some instances they were initially elective courses; but as the program progressed, they were incorporated into the regular curriculum and have been established as required courses. Some are in the nature of orientation courses which attempt to correlate the basic sciences and clinical medicine. Specific endeavors in this area through the initiation of correlation clinics or correlation courses have been reported by 27 schools. Other new courses are concerned with physical diagnosis and special cancer diagnostic procedures. Still others deal with the biology of cancer, carcinogenesis, cancer etiology, epidemiology, cancer research and experimental cancer.

Twenty-two schools have found it desirable to extend their cancer teaching in the field of cytology. Cytology laboratories have been established under these grants in 10 of the 22 schools. Isotope laboratories were established by six schools which, also, together with nine other schools, extended their cancer teaching into the field of radioisotopes.

During the program there has been a definite increase in the use of the team-teaching technique. To implement this type of teaching, 27 schools have initiated cancer symposia or cancer seminars in which the students actively participate.

Small group ward teaching has been introduced into 22 schools since the beginning of the program. All the schools have shown a strong trend to introduce the student to cancer patients earlier in his career, to increase his contacts with cancer patients, especially his diagnostic encounters, and generally to widen his over-all clinical experience. The schools have shown a corresponding decrease in didactic lectures.

A large personnel force is necessary to carry out the increased cancer teaching indicated above, and 65 of the schools report that the grants have permitted them to increase their professional staffs. In this group there are 23 schools in which the cancer coordinator represents at least a part of the increased personnel. Reports from 45 schools indicate that they have been able to add to their staffs varying numbers of ancillary employees.

The grants have enabled all the schools to increase markedly their visual educational materials, including kodachromes, lantern slides (clinical and pathological), models, moulages, museums, filmstrips, and films, and such equipment as cameras and projectors. In order to prepare their own materials, 11 schools established photographic departments. A number of cancer films have been produced by three of the schools.

Under this program, the majority of the schools have strengthened their pathology service through the preparation and collection of lantern slides (clinical and pathological) or by the addition of equipment like projectors, technicians' microscopes and scopicons. Tumor registers have been established by 18 schools and cancer registers together with follow-up programs, by 33 others. Such services have enabled 17 schools to include social and psychologic problems of cancer patients in their teaching. Moreover, these services have brought about an improvement in the medical records of at least half the schools. Reports from 55 of the schools say that the program has stimulated cancer research in their institutions, and that this has resulted in increased interest in the cancer field among students and faculty members alike. In this connection, there are 20 schools which provide student fellowships under grants, largely for student assistance on research projects.

Although the original intention was to restrict grant support to undergraduate teaching, it has become apparent that the program can not be dissociated from other interested groups. The fact that 26 schools have established visiting lectureship programs which are open to medical students, interns, residents, house officers and practicing physicians is evidence that cancer teaching has spread into the postgraduate area.

Use of Funds

It is realized that the effectiveness of the cancer teaching program cannot be reduced to a numerical evaluation. However, it is felt that the above enumeration will provide some indication of the results of the grants. Another perspective may be provided by a brief analysis of the utilization of grant funds over the years. In the first years of the program, the funds were distributed as follows: Approximately 64 per cent was allocated for personnel, 23 per cent for permanent equipment, six per cent for consumable supplies, two per cent for travel, two per cent for other expenses, and three per cent for overhead. A considerable portion of the first grants was necessarily used for permanent equipment. Since then there has been a progressive increase in the portion used for personnel, and a proportionate decrease in the amount used for equipment. The percentage allotted to overhead has been slightly more than doubled, but it has never reached the eight per cent allowable for this item. Approximately 85 to 90 per cent of the total funds are currently used for personnel with the remaining 10 to 15 per cent distributed among the other categories.

Accomplishments

Despite the difficulties of providing specific and indisputable evidence of the results of these grants, it is possible to point to a number of general accomplishments under the program:

1. It has greatly increased the awareness of cancer not only among medical students but also in medical school faculties.

2. It has stimulated the schools to

make remarkable changes in cancer teaching practices.

3. It has promoted the use of several types of visual aids which help materially in the communication of factual information to students.

4. In addition to visual aid material, it has provided other improved teaching equipment and tools.

5. It has increased the clinical instruction in cancer.

6. It has increased the emphasis on group presentation and consultation in the discovery, diagnosis and treatment of cancer.

7. It has increased the use of current knowledge about the disease through additional and supplementary courses of instruction.

8. It has improved medical service to cancer patients through the establishment of new and additional clinics and by the provision of funds for needed clinic equipment.

9. It has stimulated student interest in cancer research and assisted in the development of cancer research programs in many schools.

10. It has resulted in a greater interest in cancer teaching.

11. It has enabled institutions to secure and retain qualified teachers who might not otherwise have joined medical school faculties.

12. It has provided funds for the establishment of cytology and isotope laboratories.

13. It has provided funds for the establishment of photographic and medical illustration departments.

14. It has assisted in the establishment of more adequate record systems and in the development of follow-up programs.

15. It has made evident the need for cancer instruction in postgraduate fields and has furthered such teaching.

16. It has brought about coordination of cancer teaching, largely through increased interdepartmental cooperation, in both the preclinical and clinical years, and has materially improved the teaching.

17. It has focused attention not only on cancer but also on the ascending prominence of other diseases related to later life. It has achieved curriculum changes and changes in the concepts of medical education in keeping with the shifting demands indicated by this situation.

Lastly, it has caused a beneficial chain reaction in that improved cancer teaching has led to better teaching in general in the medical schools. In the final analysis the beneficial effects of this program cannot be based on the formulation of instruction techniques and their organization within the medical school curriculum. The program must be measured by the long-range effect the teaching will have on the reduction of cancer mortality.

Editorials and Comments

Our Readers Write

Dear Editor:

The structure of medical education in France is complex because two independent bodies compete in its organization: The "Université de France," on the one hand, which is responsible for teaching the curriculum in the medical sciences. This teaching takes place every afternoon in the medical schools during the university year; the hospitals, affiliated to a medical school, on the other hand, which organize independently the teaching and training of students at the bedside, and in-and-out-patient departments. This part of medical training takes place in the morning.

Any French student, who is in possession of the baccalaureate and of a certificate of premedical training, is entitled to register into a medical school. Besides these two prerequisites, no limitation whatsoever exists to the number of students who can register into medical schools. The largest is, in Paris, the "Faculté de Médecine de l'Unide Paris," with a total of 13,000 students, 2,000 in the first year and an annual number of graduates of more than 1,000.

The Baccalauréat is an examination which ends the curriculum of the French lycée, scholastically an equivalent of the American junior college. The premedical certificate is given by the faculty of sciences after one university year of lectures and labs in physics, chemistry and biology.

The medical curriculum which ends by the granting of an M.D. degree, lasts six years. (In France, the university year lasts eight months: from early November to early June). During this time, teaching is divided between hospital training in the morning and attendance of lectures and lab periods at the medical school in the afternoon. At this point, we must note that in Paris and in many other university cities, medical schools and hospitals may be distant from one another by several miles.

One must consider separately teaching given in the medical school and teaching given in the hospital since in both cases teachers are appointed by different bodies.

(A) *In the medical school,* teaching lasts five years: three years are devoted to the basic sciences and two years to the clinical sciences. This teaching consists mainly of lectures given in large amphitheatres. Lab periods, except in anatomy, are not frequent.

The two first years of medical teaching in the basic sciences at the medical school include anatomy, physiology, biochemistry, medical physics, histology and embryology. All these courses are given simultaneously during the university years with emphasis placed on anatomy. Yearly examinations, written and oral, take place at the end of the first two university years. The third year is devoted to bacteriology,

parasitology, pathology and experimental medicine. A comprehensive oral examination takes place at the end of this university year.

During the fourth and fifth years, clinical and environmental medicine is taught in the medical school with lectures in medicine, surgery, pharmacology, therapeutics, obstetrics, pediatrics, public health, climatology and forensic medicine. Next to this teaching in the medical school which consists mostly of lectures and which is given in the afternoon, the medical student follows, every morning, a period of clinical training which starts the first year and lasts for at least six years in the hospital.

(B) *In the teaching hospitals,* teaching responsibilities are carried out by a staff grouped around the head of the department and two or three associates; for a 120-bed ward there is next to the chief two or three assistants, two interns and eight "externs." Since the number of medical students is quite high and the number of teaching hospitals relatively small, the administration of the teaching hospitals has been led to organize among the medical students a special competitive examination or "concours" in order to select interns and externs (medical clerks). Indeed, in order to get good clinical training, attention from senior staff and a close look at patients, the medical student must at least be an extern, a position which will give him the same responsibilities as the medical clerk in the U.S.A. In the teaching hospitals of the University of Paris, there are 300 extern positions available each year, for about 1,500 applicants. This means that only one out of five medical students will become an extern. This concours is difficult; it is a written examination consisting of 15 questions which must be answered in six minutes each; five questions are related to anatomy, six to medicine, four to surgery. Speed of composition and memory are the main factors involved in a successful completion of this examination which many students start preparing during their first year of medical school during the time which is left to them, after the morning period in the hospital and after the afternoon spent at the medical school.

The medical student who has not achieved the position of extern will attend rounds and short lectures in the different medical, surgical or specialty wards, but he will have little contact with the patient, since history taking, minor lab examinations and current care are the responsibility of the extern. In addition, this medical student will only have to attend the hospital during the university year. The extern, who is appointed and given a nominal fee by the hospital administration, will have to go to the hospital during the whole year except for a month vacation.

Furthermore, the completion of "externat" is prerequisite to becoming an intern. Internship positions, in teaching hospitals, are also submitted to a competitive examination among the externs. This concours is also organized by the hospital administration. It is extremely difficult and consists of two parts: one written and one oral which takes place over a period of four months. Every year in Paris, there are 120 positions available for about 1,200 candidates (under the government of Napoleon, which is responsible for this concours, there were 80 positions available).

One becomes intern, generally after three concours and during the fourth or fifth year of medical curriculum. The period of internship

lasts four years during which the intern has the same responsibilities as the American intern during his first two years, and as the American resident during the last two years.

After the sixth year, entirely devoted to clinical training, the student will take a final examination consisting of the examination of three patients, for establishing diagnosis and treatment. After completion of this examination, he will have to write his thesis which is to be approved by a panel of three professors who will solemnly confer the title of doctor of medicine upon the student. The intern will have to wait until the end of his fourth year of internship before getting his medical degree. This is the rule of the hospital who wishes to prevent the intern from having private patients and so spending less time at the hospital.

Here again, one must consider the hospital staff and the medical school staff both recruited independently with some degree of overlapping. The majority of these positions are part-time.

(A) *The medical school* offers a certain number of positions which all are accessible through competitive examinations: Chief residents (part-time positions) responsible for the teaching of students in the university hospital. These chief residents are in the practice all former interns; assistants in anatomy, who supervise students in anatomy labs; "prosecteurs" who give anatomy lectures and "professeur agrégé" (assistant or associate professor), who gives lectures and assists the professor in his teaching.

It is a prerequisite for all professors in medical schools to be an M.D., even if they teach in premedical departments. Most professors in medical schools who teach the clinical sciences are on a part-time basis. Only part of those teaching in the basic sciences are full-time, others being part-time; for instance, many professors of anatomy are engaged in surgical practice.

(B) *The hospital administration* offers, after competitive examination, the following part-time positions: assistants in medicine, surgery or the specialties and head physicians, surgeons or specialists, who are in charge of a hospital ward. These positions are part-time (mornings) and carry a nominal salary. Consequently, the different teaching departments in the hospitals only function during the morning. In the afternoon, physicians, surgeons and specialists devote their time to their private practice at home, or in private nursing homes and clinics.

The only position, which is not awarded through competitive examination is that of professor, the professor being elected by the faculty council which groups all the professors of the medical schools. In most cases, the clinical professor in a teaching hospital has already passed successfully the concours of head physician or surgeon organized by the hospital administration.

The medical schools are financed by grants given by the Ministry of National Education. Teaching hospitals are partly subsidized by the Ministry of National Education which pays the clinical professors in the different departments, and mostly through the social security system, which, in the past years, has been partially subsidized by the state.

Dr. Gabriel G. Nahas, M.D., University of Toulouse, former Externe des Hôspitaux; M.S. University of Rochester, N.Y.; Ph.D. University of Minnesota; Diplomate of Minnesota State Board of Medical Examiners.

THE REGISTRATION DESK of the 66th Annual Meeting at New Ocean House, Swampscott, Mass. Melba Allyn of the AAMC staff was in charge of the desk. Others, from left: Dr. and Mrs. Francis M. Forster, Georgetown; Dr. and Mrs. Stephen Manheimer, Chicago Medical; and Dr. I. Davidsohn, Chicago Medical.

Report of the Sixty-Sixth Annual Meeting

REPORTS from eight schools on experiments in medical education were the highlight of the 66th Annual Meeting of the Association of American Medical Colleges, held October 24-26 at the New Ocean House, Swampscott, Mass. Two afternoon sessions of the meeting were devoted to these reports, which included such subjects as sociology, comprehensive medicine, pediatrics and clinical teaching.

Pre-Conference Meetings

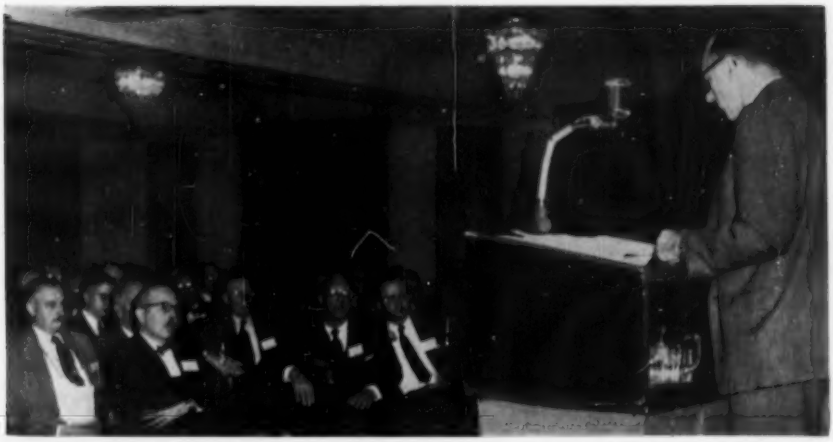
While the 66th Annual Meeting opened officially on Monday, October 24, with a record attendance of about 500 there were a number of preconference sessions.

On Saturday, October 22, the 1954-55 Executive Council and the Joint Committee on Medical Education in Time of National Emergency met with medical representatives of various government agencies. Included were the VA, Army, Navy, Air Force, Department of Defense, Civil Defense Agency, Selective Service, MEND and the Public Health Service.

Conference Reports

The meeting opened with the Presidential Address by Dr. Vernon W. Lippard, dean of the Yale University School of Medicine and retiring AAMC president.

Dr. Lippard emphasized that medical schools should have "a concern not merely for the production of skilled technicians, but for the maintenance of a university atmosphere, in which development of attitudes and character and a curiosity for pur-



DR. VERNON W. LIPPARD, the retiring president, is shown as he opened the 66th Annual Meeting of the AAMC at Swampscott, Mass.

suit of knowledge is paramount." He described the university as a place where scholars of various levels of maturity are learning together.

He also stressed that medical schools should be classified as "one of the graduate disciplines of a university," and should maintain a close integration with the university. He criticized a tendency on the part of the schools to be more concerned with their hospital than with their university obligations.

On the same subject, Dr. Lippard further stated his belief that medical faculty members should not be set apart from other university faculty members, and that medical service is not the primary function of a medical faculty. Therefore, he said, "a direct relationship between income from consultant practice and university salary is incompatible with the maintenance of university status."

He urged that more of the privileges of university life should be extended to medical faculty members, and the importance of the teacher be

1954-55 EXECUTIVE COUNCIL of the AAMC is shown at its Saturday, October 22 meeting. Back row, from left: Stockton Kimball, Buffalo; Dean F. Smiley, secretary; Thomas H. Hunter, U. of Virginia; and Walter R. Berryhill, North Carolina. Front row, from left: John Z. Bowers, Wisconsin; Robert A. Moore, Pittsburgh; Vernon W. Lippard, Yale; Stanley E. Dorst, Cincinnati; and Lowell T. Coggeshall, U. of Chicago. John McK. Mitchell, Pennsylvania; George N. Aagaard, U. of Washington; and John B. Youmans, Vanderbilt, were not present for the photo.

THESE SPEAKERS presented "reflections" from the Teaching Institute on Anatomy and Anthropology to the opening session of the meeting. From left: Sam L. Clark, Vanderbilt; William U. Gardner, Yale, chairman of this year's Institute; George Packer Berry, Harvard, chairman of the Committee on Teaching Institutes and Special Studies; Normand L. Hoerr, Western Reserve; Arnold Lazarow, Minnesota; and Gabriel W. Lasker, Wayne.

recognized, to make the medical teaching career as attractive as possible.

As his final recommendation, Dr. Lippard suggested that in the relationships of the medical school to its affiliated hospital, there should be a clear definition of the respective functions of the two institutions.

"The medical school should be responsible for teaching and research and the hospital for service. This simple formula may be applied whether the affiliated hospital is owned by the university, the community or a governmental agency."

Monday morning's session also included reflections from the Teaching Institute on Anatomy and Anthropology, which was held October 17-21, immediately preceding the Annual Meeting. Six 15-minute reports were given on the Institute. Speakers and their subjects were:

Dr. George Packer Berry, dean of the Harvard Medical School and chairman of the AAMC's Committee on Teaching Institutes and Special Studies—The Association's Program of Teaching Institutes; Dr. William U. Gardner, professor of anatomy,

THE MEND SUBCOMMITTEE is shown during its meeting on Sunday, October 23. The closed committee meetings preceded the opening of the Annual Meeting on October 24.

AMONG REPRESENTATIVES of government agencies who met with the 1954-55 Executive Council on Saturday, October 22, were these delegates from the VA. From left: Dr. Jackson H. Friedlander, chief of residency and internships; Dr. John Nunemaker, director of education; Dr. George Lyon, assistant chief medical director for education and research; Dr. William S. Middleton, chief medical director of the VA; and Dr. Francis Carroll, Boston area medical director of the VA.

Yale University School of Medicine, and chairman of the 1955 Institute's Planning Committee—Planning the Anatomy and Anthropology Teaching Institute; Dr. Normand L. Hoerr, professor of anatomy, Western Reserve University School of Medicine—The Role of Anatomy in Medical Education—Dr. Arnold Lazarow, professor of anatomy, University of Minnesota School of Medicine—The Influences of Advances in Medical Science on Anatomical Teaching; Dr. Gabriel W. Lasker, assistant professor of anatomy, Wayne University College of Medicine—Anthropology in Medical Education; and Dr. Sam L. Clark, professor of anatomy, Vanderbilt University School of Medicine—The Recruitment and Training of Teachers of Anatomy.

On the recommendation of the Committee on Teaching Institutes and Special Studies, the Council announced that the next two years will be required to prepare for the 1957 Teaching Institute which will be on Clinical Teaching and Internships.

Borden Award

The 1955 Borden Award in the Medical Sciences was presented to Dr. Charles B. Huggins, director of

A HIGHLIGHT of the Annual Banquet was the presentation of the 1955 Borden Award to Dr. Charles B. Huggins, of the University of Chicago, shown at right. John H. McCain of the Borden Company Foundation gave the award.

the Ben May Laboratory for Cancer Research and professor of urology, University of Chicago School of Medicine. The award, consisting of a gold medal and $1000, was presented by John H. McCain, of the Borden Company Foundation. Dr. Joseph Markee, of Duke University, made the nominating address.

Dr. Huggins' nomination was based on his outstanding contribution in the field of cancer research, particularly that portion of the field which deals with the relationships between the endocrine glands and cancer. It was Dr. Huggins who firsf demonstrated that deprivation of the male hormone by castration curbed the activity of prostatic cancer and its metastases. He extended his work to show that by bilateral adrenalectomy certain tumors of the mammary gland will be likewise halted in their further growth. In recent work he has been able to identify by examination of their basic cellular composition which of the various tumors will respond to this new type of treatment.

Annual Banquet

Main speaker at the banquet on Monday was Dr. J. Dixon Boyd, professor of anatomy at Cambridge University, England, who spoke on "Trends in Medical Education in Great Britain."

Dr. Boyd stressed that educators in Britain are becoming more concerned with the general practitioner and his needs. He cited five main trends in British medical education, as follows:

1. Less emphasis on scientific courses in primary and secondary school, to eliminate a tendency to specialize too early.
2. A reversal of the recent elaborate methods of student selection back to the traditional systems.
3. A lighter curriculum at the preclinical level.
4. More integration of preclinical subjects, particularly anatomy and physiology.
5. A feeling that the present three-months ward course is too long a period to devote to bridging the gap between clinical and preclinical studies.

Dr. Boyd also said that the problems of British and American medical educators were 90 per cent similar, and he stated his belief that the National Health Service has had little effect on medical education in Great Britain.

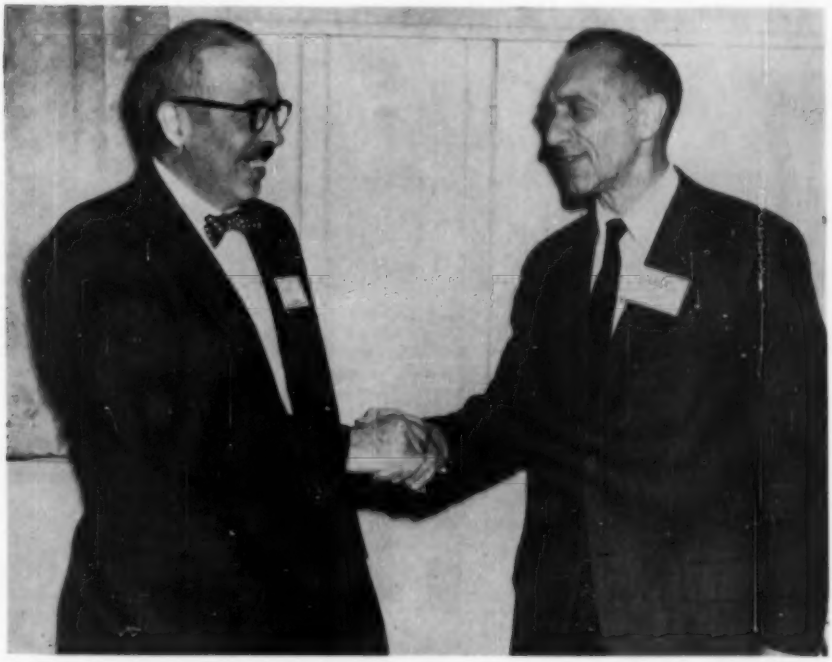
PRINCIPAL SPEAKER at the Annual Banquet was Dr. J. Dixon Boyd, professor of anatomy of Cambridge University, England, who spoke on "Trends in Medical Education in Great Britain."

Business Meeting

At the Business Meeting on October 25, 394 new individual members were voted into the Association. This is the second year that individual memberships have been offered. It was also announced that the W. B. Saunders Co., of Philadelphia, Pa., has become the Association's first Sustaining Member. The University of Montreal Faculty of Medicine was voted into full Affiliate Institutional Membership.

The business meeting included reports of the AAMC's standing committees, plus the reports of the Executive Council, the secretary and the treasurer, the director of research and the director of the Medical Audio-Visual Institute.

The Association passed a resolution of appreciation to John M. Stalnaker, who recently left his position as director of studies to become president of the National Merit Scholarship Corp. A resolution went also to Roscoe Miller, president of Northwestern University; to the Alfred P. Sloan Foundation Inc. and to The China



INCOMING AND RETIRING PRESIDENTS of the AAMC are shown above. Left, Dr. Robert A. Moore, vice chancellor of the schools of the health sciences, University of Pittsburgh, and Dr. Vernon W. Lippard, dean of the Yale University School of Medicine. Dr. Moore was installed as the 1955-56 AAMC president on October 26.

Medical Board of New York, Inc., for their contributions, of land and financial aid, which enabled the Association to begin plans for its permanent building in Evanston, Ill. Northwestern University presented the Association with the land.

Another resolution expressed to Dr. Anton J. Carlson, retiring president of the National Society for Medical Research, the gratitude of the Association for his "invaluable contribution to public understanding and support of medical education and medical research."

The Association also went on record as "heartily endorsing" the Department of Defense Senior Student Program as a "significant step toward increasing the complement of career medical officers."

New Officers

New officers elected for the coming year are Robert A. Moore, Pittsburgh, president; John B. Youmans, Vanderbilt, president-elect; Harold S. Diehl, Minnesota, vice president and Stockton Kimball, Buffalo, treasurer. John Z. Bowers, Wisconsin, succeeded himself as a Council member, and the

JOHN B. YOUMANS, Vanderbilt, shown as he delivered the treasurer's report. Dr. Youmans is the new president-elect and will serve as president in 1956-57.

FIRST MEETING of the 1955-56 Executive Council was held Tuesday evening, October 25. Clockwise, from the head of the table, are: Robert A. Moore, Pittsburgh, the new AAMC president and chairman of the council; Melba Allyn, AAMC staff; Walter R. Berryhill, North Carolina; Stockton Kimball, Buffalo, the new treasurer; John B. Youmans, Vanderbilt, the president-elect; Lowell T. Coggeshall, U. of Chicago; John F. Sheehan, Stritch; Thomas H. Hunter, U. of Virginia; George N. Aagaard, U. of Washington; Vernon W. Lippard, Yale, retiring president; William N. Hubbard Jr., associate secretary and Dean F. Smiley, secretary.

new Council member is John F. Sheehan, Stritch School of Medicine. The new Council chairman is Robert A. Moore, Pittsburgh.

1956 Meeting

The 67th Annual Meeting of the Association will be held November 12-14, 1956, at the Broadmoor Hotel, Colorado Springs, Colo.

Council Actions

The Executive Council announced that a visitation schedule of 13 schools has been planned for 1955-56. It was also announced that the Council has accepted an invitation from the American Medical Association to appoint representatives to work with the AMA committee in planning a program for the Second World Conference on Education to be held in the U. S., probably in 1959.

A committee consisting of John Z. Bowers, chairman; Robert A. Moore, Richard H. Young and William Willard was appointed to meet with Dr. M. H. Trytton of the National Research Council to explore the possibility that the Association sponsor a Conference of Visiting Fulbright Scholars in the medical field in 1956.

Two film programs were presented Tuesday evening, one of general interest and one of medical interest. The medical film was a television report on film. The general interest film was "The Loon's Necklace."

On Wednesday morning a symposium on the compensation of faculties of the clinical departments was held. The participants were: Lowell T. Coggeshall, University of Chicago; Wilburt C. Davison, Duke University; Thomas H. Hunter, University of Virginia; Norman B. Nelson, University of Iowa and George Packer Berry, Harvard University.

NEWS DIGEST

MEND News

The following is a description of an exercise for field training in mass casualty care, as developed by MEND Coordinator Dr. John Howard and Dean Stanley W. Olson of Baylor. Complete records of all medical treatment and disposition of patients were kept for study by members of the faculty and students.

The assumption was made that the city of Houston was entirely intact in so far as its utilities and facilities for medical care were concerned. It was assumed that the city of Beaumont (population 120,000), some 90 miles from Houston, had suffered a severe explosion in a large oil refinery, resulting in a complete disruption of public utilities in Beaumont and an overwhelming swamping of the medical facilities there. In the practice maneuver, this "explosion" came without warning to the organizers of a mobile hospital unit in Houston, designed to be able to care for 250 major surgical casualties for a period of approximately six hours. All necessary supplies for the six-hour period were drawn at the time of the alert from the shelf-stores of four hospitals of the Texas Medical Center. The entire group of personnel and supply vehicles were conveyed by police escort to Beaumont, a sorting station was established in a furniture warehouse near the site of the disaster, and the hospital was established in an elementary school located nearby. Two hundred and fifty major surgical "casualties" had been tagged and scattered around the disaster area. Litter bearers brought the casualties to the sorting area where triage was effected and necessary resuscitation done. Chosen casualties were moved to the improvised hospital, prepared and draped, and indicated surgical procedures timed. The first "patient" was admitted to the improvised hospital five hours and 15 minutes after the initial alert had been received in Houston.

Women Leaders

Seven women doctors graduated first in their medical school classes this year, and as a result received $100 plus an award of achievement citation from the American Medical Women's Association. An additional 47 honorable mention citations were awarded to women who were graduated among the first 10 in their classes.

The AMWA, in making these awards for the third consecutive year, announces that a total of 329 women graduated from 69 medical schools in 1955. Two of the women who won first place awards were the only women students in their senior classes.

National Board Exams

The 1956 examination schedule of the National Board of Medical Examiners has been announced. Parts I and II will be given on June 19 and 20. Part II only will be given on April 24 and 25. Part I only will be given on September 4 and 5. All applications must be received by the National Board at least six weeks before the date of the examination for which application is made.

Medical Writers' Meeting

The American Medical Writers' Association held its 12th annual meeting in St. Louis on September 30. The president-elect, for 1956-57, is Dr. Dean F. Smiley, AAMC Secretary and editor of the Journal.

The association voted a distinguished service award to Dr. Lee D.

Antwerp, medical editor of G. D. Searle Co. and 1955 president of the AMWA. Also honored, with awards for distinguished service in medical journalism, were the following publications: Public Health Reports, A.M.A. Archives of Surgery and the Bulletin of the Sangamon County Medical Society.

It was announced at the meeting that three schools of journalism—Missouri, Illinois and Oklahoma—currently feature courses in medical journalism. The AMWA itself maintains a manuscript editing service, which is available at low cost for physicians who are preparing papers of 5,000 words or less for publication in medical journals.

Following the meeting, a one-day workshop in medical writing was held under the direction of Dr. Richard Hewitt, associate professor of medical literature at the Mayo Foundation.

Librarians Conference

The 27th annual conference of the American Association of Medical Record Librarians met in Chicago October 3 to 7. More than 600 persons attended.

The delegates heard speeches by Philip E. Ryan, executive director of the National Health Council, Dr. Jack Masur, chief of the bureau of medical services, Public Health Service, and Howard Wilson, director of the human relations projects at the University of Chicago.

Addressing the conference banquet was Dr. Charles W. Mayo, who spoke on the significance of the United Nations. Dr. Mayo was a delegate to the eighth General Assembly of the U.N. and is president of the American Association for the United Nations.

Another convention highlight was a tour of five Chicago hospitals—Grant, Chicago Wesley Memorial, St. Luke's, University of Chicago Clinics and the University of Illinois Research and Educational Hospitals—to visit their medical record departments.

Officially installed as president of the 35,000 member organization was Mrs. Eddie V. Cooksey, of Charity Hospital in New Orleans. President-elect for 1956-7 is Dorothy L. Kurtz, of Columbia Presbyterian Medical Center.

Colombian Seminar

Colombia is to have its first seminar in medical education from December 6 to 10, at the Universidad del Valle. Seven medical schools will participate, and more than 100 professors are expected to attend.

The Colombian government and the *Federacion Medica Colombiana* will both have technical experts in attendance. Also present will be representatives of the World Health Organization, the Institute on Inter-American Affairs, the Rockefeller Foundation and the Kellogg Foundation.

College Briefs

Boston

A grant of $30,000 from the American Cancer Society, one of a series which began in 1953, has just been announced. It will be used to study various types of breast cancer and to determine the amount of X-ray treatment that can be applied to cancerous body tissue. The study will be directed by Dr. CHESTER S. KEEFER, director of the school of medicine. Dr. HENRY M. LEMON, associate professor of medicine, will serve as executive secretary.

Bowman Gray

Dr. ISADORE MESCHAN is the new

RENARD HOSPITAL, the new psychiatric unit of Washington University—Barnes Hospital, which was formally dedicated on October 10. The 98-bed, six-story hospital was built at a cost of $1,580,000, and is named after the late Mr. and Mrs. Wallace Renard, whose contributions made the project possible.

director of the department of radiology. He was formerly professor and head of the department of radiology at the University of Arkansas Medical Center.

Dr. THOMAS HAROLD ODDIE has been appointed associate professor of physics in the department of radiology. A native of Australia, Dr. Oddie came to this country in 1953 on a Fulbright grant as assistant professor in the department of radiology at the University of Arkansas School of Medicine.

Emory

Dr. JOHN M. HOWARD has been appointed Joseph Brown Whitehead professor, and chairman of the department of surgery. He was formerly assistant professor of surgery at Baylor. From 1951 to 1953, Dr. Howard headed a medical research team studying battle casualties in Korea.

Howard

A full time department of preventive medicine and public health has been established, headed by Dr. PAUL B. CORNELY.

Maryland

Dr. ROBERT WILLIAM BUXTON, formerly associate professor of surgery at Michigan, is the new chairman of the department of surgery.

Meharry

A total of $144,770 in grants-in-aid has been received for current research projects. This is both the largest number of grants and the greatest amount of money received in the college's 80-year history.

Missouri

Dr. FRANK B. ENGLEY Jr. is the new chairman of the department of microbiology. He was formerly associate professor of bacteriology at the University of Texas Medical Branch at Galveston.

Oklahoma

Two new psychiatrists have been appointed, following the legislature's appropriation of funds to begin operation of an inpatient psychiatric service at university hospitals. They are Dr. DONALD C. GREAVES, associate professor, and Dr. JOHN GUSSEN, as-

sistant professor. Dr. Greaves was formerly attending psychiatrist at the Payne Whitney Clinic in New York. Dr. Gussen was on the staff of Karoline University in Stockholm.

St. Louis

Dr. R. WALTER SCHLESINGER has been appointed professor of microbiology and director of the department. Dr. Schlesinger was formerly an associate member of the division of infectious diseases at the Public Health Research Institute of the City of New York.

Toronto

Dr. W. E. GALLIE, professor emeritus of surgery, was awarded the honorary fellowship of the Royal College of Surgery, Edinburgh, during the celebration of the college's 450th anniversary.

Dr. W. G. BIGELOW of the department of surgery was awarded a medal for the best scientific presentation at the recent meeting of the International Surgical Society in Copenhagen. He is the first person to receive this award.

Tulane

A new 10-story addition to Hutchinson Memorial medical building, which houses the school of medicine, was formally dedicated in ceremonies on October 13. The principle address was given by Dr. A. J. Warren, former director of the division of medicine and public health of the Rockefeller Foundation.

A tour of the new facilities was held after the formal ceremonies. Following this was a roundtable discussion on medical education. An open house and reception was held on October 15.

Washington, St. Louis

A new dermatology division, the first of its kind in a privately endowed university, has just been established under a grant of $400,000 from the Rockefeller Foundation. Heading the new division will be Dr. HERMAN N. EISEN, formerly associate professor of industrial medicine at New York University Post Graduate Medical School.

A $26,050 grant from the National Science Foundation has been awarded to Dr. OLIVER H. LOWRY, professor and head of the department of pharmacology, for a three-year study of riboflavin enzymes.

Yale

The university is organizing a new graduate program in medical sociology to prepare students for teaching, research and administrative positions involving the social aspects of health and medicine.

The program will be financed by a grant of $58,000 from the Commonwealth Fund, and a $9,000 grant from the Russell Sage Foundation will support a study unit in medicine and sociology which will guide the new course of study. The program will open in the fall, under the direction of AUGUST B. HOLLINGSHEAD, professor of sociology, and will be designed for candidates for the Ph.D. degree in sociology who have completed two years of graduate study. LEO W. SIMMONS, professor of sociology, will direct the faculty study unit which will guide the program.

You can prevent attacks in angina pectoris

Fear is a faithful companion. In angina pectoris, particularly, many patients live in constant dread of recurrent attacks.

Prophylaxis with Peritrate, a long-acting coronary vasodilator, offers new security in a majority of such cases. A single dose affords protection for as long as 4 to 5 hours, compared to 30 minutes or less with nitroglycerin.

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A variety of convenient dosage forms now extends these benefits. Peritrate Delayed Action tablets (10 mg.), taken with the regular bedtime dose of Peritrate (plain) help allay the fear of nighttime attacks. Adapted to the recommended daily dosage of 40-80 mg., Peritrate is available in 10 mg. and 20 mg. tablets. And when added sedation is indicated, you can prescribe Peritrate (10 mg.) with Phenobarbital (15 mg.).

1. Winsor, T., and Humphreys, P.: Angiology *3*:1 (Feb.) 1952. 2. Plotz, M.: New York State J. Med. *52*:2012 (Aug. 15) 1952. 3. Dailheu-Geoffroy, P.: L'Ouest-Médical, vol. 3 (July) 1950.

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WARNER-CHILCOTT

FILMS IN ANATOMY

J. E. Markee
N. L. Hoerr

The following list of films in anatomy was prepared in cooperation with the Medical Audio-Visual Institute for the 1955 Teaching Institute on Anatomy and Anthropology.

The list is not intended to replace existing film catalogs. Rather it is intended as a ready reference to a variety of commonly known catalogs. A key to distributors and information sources follows the list.

No attempt has been made to be selective. Further, the list cannot be assumed as all-inclusive. For ready reference the films have been classified as shown at the right.

Classification of Films

Cardiovascular	Methods and Equipment
Cytology	Neurology
Embryology	Physiology
Functional Anatomy	Radiography
Genetics	Reproduction
Gross Anatomy	Surgical

Cardiovascular

TITLE	AUTHOR &/OR PRODUCER	PHYSICAL DATA	LOAN &/OR RENT	SALE
Activity of heart muscle from rat embryos, grown in tissue culture	C. M. Goss	12 min., si., b&w., 1935	Goss ($4)	Goss ($25)
Aortic valve movements. Preliminary study of unfixed postmortem valves	I. K. R. McMillan	7 min., si., color, 1952	M.A.V.I. ($4)	M.A.V.I. ($90)
Blood streams in the basilar artery	D. A. McDonald J. M. Potter	9.5 min., sd., color, 1949	A.M.A. ($1.50)	
Cardiac output in man	I.C.I. Film Unit	38 min., sd., color, 1951	I.C.I. ($4)	I.C.I.
A cinematographic record of microscopical observations of the small blood vessels of the spiral ligament and stria vascularis of living guinea pigs	S. R. Gargano F. L. Weille J. W. Irwin			
A cinematographic study of the function of the mitral valve in situ	A. Kantrowitz E. S. Hurwitt Antol Herskovitz	13 min., sd., color, 1952	M.A.V.I. ($5) A.M.A. ($2)	M.A.V.I. ($85)

Cardiovascular (continued)

TITLE	AUTHOR &/OR PRODUCER	PHYSICAL DATA	LOAN &/OR RENT	SALE
Congenital malformations of the heart: Reel 1: Development of the normal heart	R. F. Rushmer R. J. Blandau	sd., color 15 min., 1952	Film Center ($2.25) A.M.A. ($3.00)	Film Center ($125)
Reel 2: Acyanotic congenital heart disease	R. F. Rushmer	14 min., 1952	Film Center ($2.25) A.M.A. ($3.00)	($115)
Reel 3: Cyanotic congenital heart disease	R. F. Rushmer	29 min., 1953	Film Center ($4.25) A.M.A. ($3)	($195)
Contraction of arteries and arteriovenous anastomoses	E. R. Clark	10 min., si., 1935	A.M.A. ($1)	
Contractions of early embryonic rat heart	C. M. Goss	11 min., si., b&w., 1941	Goss	
Contraction of valve of the foramen ovale of a newborn lamb	A. E. Barclay J. Barcroft D. H. Barron K. J. Franklin	2.5 min., si., b&w., 1940	M.A.V.I. ($2)	B.F.I. ($5)
Control of small blood vessels	G. P. Fulton B. R. Lutz	20 min., si., b&w., 1941	Fulton	Fulton
Effects of drugs on the isolated heart	R. P. Walton	11 min., si., color, 1946	M.A.V.I. ($4)	
Effects of heat and cold on the circulation of the blood	E. R. Clark	10 min., si., b&w., 1933	A.M.A. ($1)	
Effects of massage on the circulation of the blood	E. R. Clark	7 min., si., b&w., 1933	A.M.A. ($1)	

WARNER-CHILCOTT

Cardiovascular (continued)

TITLE	AUTHOR &/OR PRODUCER	PHYSICAL DATA	LOAN &/OR RENT	SALE
Mesenteric lymphatics: Their contractions and behavior of their valves in the living rat	R. L. Webb	12.5 min., si., b&w., 1934	Wistar ($4) C.F.I. ($1.50)	
Microcirculation of the spleen of the mouse	A. K. Parpart A. O. Whipple J. J. Chang		Parpart	Parpart
Microscopic observations of the acute effects on the extra and intra hepatic circulation produced by anti-red cell sera	E. H. Bloch C. Pievella		Bloch	Bloch
Microscopic studies in living mice with transplant chamber methods	G. H. Algire J. M. Weaver		Algire	Algire
Das Myocard	H. Schafer	48 min., si., b&w.	B. & S.	B. & S.
Operations of valves of an ox heart	Armed Forces Institute of Pathology	6 min., si., b&w., 1949	A.F.I.	
Patent ductus arteriosus (Two parts)	G. H. Humphreys II Sturgis-Grant	25 min., sd., color, 1952 (Pt. I) 1950 (Pt. II)	Squibb	
Phase microscopy of normal living blood cells: Part 1, Peripheral blood	R. J. Blandau Q. B. de Marsh P. H. Ralph	27 min., sd., color, 1954	A.M.A. ($3)	Film Center ($195)
Subcutaneous blood flow in the bat: Reel I: Vascular Patterns Reel II: Behavior of blood and vascular components Reel III: Active Vasomotion	R. L. Webb P. A. Nicoll	11 min. (ea.), sd., b&w., 1948	Indiana M.A.V.I. ($8)	Indiana (1 reel: $40) (3 reels: $100)
William Harvey and the circulation of the blood	Royal College of Physicians T. Lewis H. Dale	48 min., si., b&w., 1928	C.F.I. ($4.50)	R.C.P.

Cardiovascular (continued)

TITLE	AUTHOR &/OR PRODUCER	PHYSICAL DATA	LOAN &/OR RENT	SALE
Effect of various drugs on contractions of mesenteric lymphatics in the rat	R. L. Webb	300 ft., 1940	Wistar ($3)	
First heart beats and the beginning of circulation of blood in the embryo	B. M. Patten T. C. Kramer	35 min., si., b&w., 1928-32 (R 1948-50)	A.M.A. ($2)	
Functions of the carotid sinus and aortic nerves, Part: I: Presoreceptors	A. Schweitzer	39 min., sd., color, 1950	I.C.I. ($4)	I.C.I.
Functions of the carotid sinus and aortic nerves, Part II: Chemoreceptors	A. Schweitzer	32 min., sd., color, 1950	I.C.I. ($4)	I.C.I.
Growth of capillaries and endothelium	W. H. Lewis	6 min., si., b&w. 1936	Wistar ($2)	Wistar ($10)
The heart: Cardiovascular pressure pulses	C. J. Wiggers F. D. Johnston Kling Studios	23 min., sd., color, 1950	Searle	
The heart and circulation	A. J. Carlson	11 min.		E.B. ($50)
Intrinsic contractility of the heart of the mammalian (rat) embryo	E. K. Hall	250 ft., b&w., 1941	Wistar ($2.50)	
The in vivo microscopic anatomy and physiology of the liver as determined by quartz rod trans-illumination	E. H. Bloch		Bloch	Bloch
Knowlesi malaria in monkeys	M. H. Knisely E. H. Bloch K. W. Stratman-Thomas T. S. Eliot	64 min., si., color, 1942		
The lymphatic system	J. M. Yoffey W. K. Metcalf	45 min., sd., color, 1950	I.C.I. ($8)	

Cytology

TITLE	AUTHOR &/OR PRODUCER	PHYSICAL DATA	LOAN &/OR RENT	SALE
A cinematographic record on human peripheral blood leucocytes	K. M. Richter	25 min., si., b&w., 1954	M.A.V.I. ($4)	
Cultures of normal and cancer cells. Rat sarcomas and carcinomas	W. H. Lewis	400 ft., 1932	Wistar ($4)	Wistar ($25)
Dividing cancer cells	W. H. Lewis	160 ft., 1936	Wistar ($2)	Wistar ($10)
Dividing normal adult rat fibroblasts in tissue cultures	W. H. Lewis	6 min., si., b&w., 1939	Wistar ($2) C.F.I.	Wistar ($10)
Growth of capillaries and endothelium	W. H. Lewis	6 min., si., b&w., 1936	Wistar ($2)	Wistar ($10)
Locomotion of Chaos chaos, the giant ameba	W. H. Lewis	400 ft., 1951	Ref. copy at Wistar	
Locomotion of the slime mold, Physarum polycephalum	W. H. Lewis	400 ft., 1951	Wistar ($4)	Wistar ($25)
Mitochondria (Two reels): Reel 1: Normal chondriosomes Reel 2: Experimental modifications of chondriosomes	J. Frederic M. Chevremont	400 ft. (ea.) French titles	T.C.A. ($3.50) (ea.)	F. & C.
Nerve fibers and neuroglia in tissue cultures	W. H. Lewis M. R. Lewis	400 ft., 1951	Wistar ($4)	Wistar ($25)
Normal and abnormal white blood cells in tissue cultures	W. H. Lewis M. R. Lewis A. R. Rich M. M. Wintrobe	16 min., si. b&w., 1939	Wistar ($4)	Wistar ($25)
Phase microscopy of normal living blood cells: Part I, Peripheral blood	R. J. Blandau Q. B. deMarsh P. H. Ralph	27 min., sd., color, 1954	A.M.A. ($3)	Film Center ($195)
Pinocytosis, Drinking by cells	W. H. Lewis	7 min., si., b&w., 1936	Wistar ($3)	Wistar ($16.50)

Embryology

TITLE	AUTHOR &/OR PRODUCER	PHYSICAL DATA	LOAN &/OR RENT	SALE
Abnormalities of extremities	J. Sarnoff	12 min., si., b&w.		Sarnoff ($40)
Abnormalities of gastrointestinal and genitourinary tracts	J. Sarnoff	20 min., si. b&w.		Sarnoff ($40)
Activity of heart muscle from rat embryos, grown in tissue culture	C. M. Goss	12 min., si., b&w., 1935	Goss ($4)	Goss ($25)
Cleavage, 2-8 cells, of living monkey egg in vitro	W. H. Lewis C. G. Hartman	80 ft., 1934	Wistar ($1.50)	Wistar ($5)
Congenital malformations of the heart: Reel 1: Development of the normal heart	R. F. Rushmer R. J. Blandau	sd., color 15 min., 1952	Film Center ($2.25) A.M.A. ($3)	Film Center ($125)
Reel 2: Acyanotic congenital heart disease	R. F. Rushmer	14 min., 1952	Film Center ($2.25) A.M.A. ($3)	($115)
Reel 3: Cyanotic congenital heart disease	R. F. Rushmer	29 min., 1953	Film Center ($4.25) A.M.A. ($3)	($195)
Development of the gastro-intestinal tract, Part I; Anomalies in the development of the gastro-intestinal tract, Part II	J. J. McDonald	I: 35 min., sd., color, 1946 II: 20 min., si., color, 1946	C.M.C. ($15) C.F.I. A.M.A. (I) ($4)	C.M.C. (I: $275 II: $130 Set: $375)
Development of the nervous system	J. J. McDonald	20 min., si., b&w., 1939	N.W.	N.W.
Development of the salamander	L. S. Stone T. C. Kramer	15 min., si., b&w.	Films, Inc.	Films, Inc.

Embryology (continued)

TITLE	AUTHOR &/OR PRODUCER	PHYSICAL DATA	LOAN &/OR RENT	SALE
Development of the zebra fish egg	W. H. Lewis E. C. Roosen-Runge	15 min., si., b&w., 1944	Wistar ($4)	Wistar ($25)
The early development of the rabbit egg	W. H. Lewis P. W. Gregory	17 min., si., b&w., 1934	Wistar ($4) C.F.I. ($1.50)	Wistar ($25)
The early development of the rabbit egg (Short film —selected scenes from long film)	W. H. Lewis P. W. Gregory	3 min., si., b&w., 1934	Wistar ($1.50)	Wistar ($5)
Early human fetal activity	D. Hooker	14.5 min., si., b&w., 1952	Wistar ($3)	Wistar ($25)
Embryology of the eye	G. W. Corner G. K. Smelser	43 min., sd., color, 1950	A.M.A. ($3)	A.A.O.O. ($250)
Embryology and pathology of the intestinal tract	L. Chaffin W. Snyder	14.5 min., sd., color, 1954	L.C. & W.S.	
First heart beats and the beginning of circulation of blood in the embryo	B. M. Patten T. C. Kramer	35 min., si., b&w., 1928-32 (R 1948-50)	A.M.A. ($2)	
Gastrulation of Amblystoma punctatum	W. H. Lewis	400 ft., 1951	Wistar ($4)	Wistar ($25)
Patent ductus arteriosus (Two Parts)	Sturgis-Grant G. H. Humphreys II	25 min., sd., color, 1952 (Pt. I) 1950 (Pt. II)	Squibb	
Reproductive processes of the frog, Rana pipiens	R. Rugh	1,350 ft.		Rugh ($65)
Where chick life begins	A. L. Romanoff	400 ft., color	Ralston	Ralston

Functional Anatomy

TITLE	AUTHOR &/OR PRODUCER	PHYSICAL DATA	LOAN &/OR RENT	SALE
Effects of drugs on gut movements (two parts)	R. P. Walton	25 min., si., color, 1945	M.A.V.I. ($6)	Walton
Functional anatomy of the hand	J. E. Markee D. L. Eyler	31 min., sd., color, 1951	N.F.I.P. M.A.V.I. ($2) A.M.A. ($1.50)	Markee ($151.90)
Functional study of the tongue and the velo-pharyngeal musculature	D. A. Listiak	8 min., sd., color, 1950	A.V.E.S.	A.V.E.S. ($90)
High speed motion pictures taken with stroboscopic light	H. E. Edgerton K. J. Germeshausen H. E. Grier	1 reel	Ref. copy at Wistar	
Intra-oral and pharyngeal structures and their movements	V.A.	23 min., sd., color, 1951	V.A.	U.W. ($132.64)
Muscles of the human body in action	J. Sarnoff	20 min., si., b&w.		Sarnoff ($40)
Nerve blocks and nerve lesions: Reel 1: The radial nerve Reel 2: The median nerve Reel 3: The ulnar nerve Reel 4: Double nerve blocks	J. E. Markee	38 min., sd., color, 1955	N.F.I.P. M.A.V.I. ($2)	Markee ($178.12)
Principles of fracture reduction	Churchill-Wexler Film Productions	30 min., sd., color, 1953	M.A.V.I. ($7) A.M.A. ($3)	M.A.V.I. ($178.12)
Structure and function of the vestibular apparatus	R. J. Blandau N. B. Everett	20 min., sd., color, 1954	Film Center ($4.25) A.M.A. ($3)	Film Center ($195)

TITLE	AUTHOR &/OR PRODUCER	PHYSICAL DATA	LOAN &/OR RENT	SALE
Genetics				
Heredity	H. H. Strandskov	11 min., sd., b&w., 1938	P.C.R. ($1.75) C.F.I. ($1)	E.B. ($50)
Gross Anatomy				
Breast self examination	National Cancer Institute	16 min., sd., color, 1950	A.C.S.	A.C.S. ($70)
The bronchopulmonary segments (Part I: Anatomy and bronchoscopy)	C. L. Jackson J. F. Huber C. M. Norris	31 min., sd., color, 1955	Pfizer M.A.V.I. ($2)	
Bronchovascular anatomy	W. E. Bloomer A. A. Liebow M. R. Hales	23 min., sd. (mag.) color, 1953	Authors: Yale	
Dissection of the orbit	W. H. Hollinshead	2,100 ft., color	Hollinshead	Hollinshead ($300)
Demonstration dissections:	J. E. Markee W. H. Hollinshead C. Young J. Baluss E. B. Dunlap	color, 1946-50	M.A.V.I.	Markee
Abdomen I & II		108 min.		($391.02)
Arm and forearms		41 min.		($148.36)
Back, buttocks, and pectoral girdle		23 min.		($84.26)
Back & spinal cord		25 min.		($91.82)
Cranium, ear, pharynx, nose, larynx		42 min.		($150.74)
Deep face I & II		29 min.		($106.10)
Female perineum & pelvis		33 min.		($121.64)
Male pelvis		47 min.		($162.10)

TITLE	AUTHOR &/OR PRODUCER	PHYSICAL DATA	LOAN &/OR RENT	SALE
Gross Anatomy (continued				
Male perineum		33 min.		($121.64)
Pectoral region, axilla & abdominal wall		21 min.		($76.98)
Plantar & dorsum of foot		55 min.		($199.08)
Superficial face & neck (I & II)		30 min.		($111)
Thigh I & II		28 min.		($100.50)
Thorax		43 min.		($160.36)
Thorax II		36 min.		($131.56)
Demonstration dissections:				
Hand, Reels 1, 2, 3	J. E. Markee	60 min., sd., color, 1955	M.A.V.I.	Markee ($375)
Inguinal canal & scrotal contents	J. E. Markee	25 min., sd., color, 1955	M.A.V.I.	Markee ($110)
Anatomy of the arm, forearm and hand	D. P. Quiring E. L. Boroush	52 min. (4 reels), si., color, 1945-48	A.M.A. ($4)	
Anatomy of the leg and foot	D. P. Quiring J. H. Warfel	83 min. (5 reels), 1945-48	A.M.A. ($5)	
Anatomy of the perineum	D. P. Quiring E. L. Lewis	29 min., si., color, 1945-48	A.M.A. ($2)	
Methods and Equipment				
Activity of heart muscle from rat embryos, grown in tissue culture	C. M. Goss	12 min., si., b&w., 1935	Goss ($4)	Goss ($25)
Dividing normal adult rat fibroblasts in tissue cultures	W. H. Lewis	6 min., si., b&w., 1939	Wistar ($2)	Wistar ($10)
The eyes of science	Bausch & Lomb	3 reels	apply B. & L. Ref. copy at Wistar	
High speed motion pictures taken with stroboscopic light	H. E. Edgerton K. J. Germeshausen H. E. Grier	1 reel	Ref. copy at Wistar	
High speed motion pictures of the human vocal cords	Bell Telephone Co.	31 min., si., 1938	A.M.A. ($2)	

Methods and Equipment (continued)				
TITLE	AUTHOR & OR PRODUCER	PHYSICAL DATA	LOAN & OR RENT	SALE
The in vivo microscopic anatomy and physiology of the liver as determined by quartz rod transillumination	E. H. Bloch		Bloch	Bloch
Microscopic studies in living mice with transparent chamber methods	G. H. Algire J. M. Weaver		Algire	Algire
Normal and abnormal white blood cells in tissue cultures	W. H. Lewis M. R. Lewis A. R. Rich M. M. Wintrobe	16 min., si., b&w., 1939	Wistar ($4)	Wistar ($25)
Seeing the unseen	H. E. Edgerton	1 reel	Ref. copy at Wistar	
Unseen worlds	R. C. Victor	1 reel, sd., b&w.	I.V.T.	I.V.T.
Neurology				
Autonomic nervous system:	J. E. Markee R. F. Becker M. Williams	sd., color, 1955	M.A.V.I. ($2) N.F.I.P.	Markee
Reels I & II, Basic Pattern		40 min.		($170.62)
Reel III, Autonomic innervation of the adrenal		18 min.		($97.50)
Reel IV, Autonomic innervation of the bladder		13 min.		($75)
Reel V, Autonomic innervation of the eye		21 min.		($102.50)
Reel VI, Autonomic innervation of the glands of the head		13 min.		($75)
Development of the nervous system	J. J. McDonald	20 min., si., b&w., 1939	N.W.	N.W.
Effect of electrical stimulation of the right ansiform lobe of the cerebellum of the cat (Felis domestica)	S. L. Clark	100 ft.	Clark	Clark

Neurology (continued)

TITLE	AUTHOR &/OR PRODUCER	PHYSICAL DATA	LOAN &/OR RENT	SALE
Motor disorders in nervous diseases:	E. Herz T. J. Putnam	si., b&w., 1946	C.M.C.	C.M.C. ($450)
Abnormal involuntary movements		30 min.	($6)	($55)
Disorders of gait		40 min.	($7)	($60)
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Nerve fibers and neuroglia in tissue cultures	W. H. Lewis M. R. Lewis	400 ft., 1951	Wistar ($4)	Wistar ($25)
The nervous system (5 parts)	I. V. Pavlow	14 reels (15 min. ea.) si., b&w., 1936	Brandon P.C.R. ($1.75)	Brandon
Phase microscopy of normal living blood cells: Part I, Peripheral blood	R. J. Blandau Q. B. deMarsh P. H. Ralph	27 min., sd., color, 1954	A.M.A. ($3)	Film Center ($195)

Physiology

Alimentary tract	A. J. Carlson H. G. Swan	11 min., sd., b&w., 1939	C.F.I. ($1)	E.B. ($50)
Control of small blood vessels	G. P. Fulton B. R. Lutz	20 min., si., b&w., 1941	Fulton	Fulton
Digestion of foods	A. J. Carlson H. G. Swann	10 min., sd., b&w., 1938	Kansas ($2) Wyo. C.F.I. ($1)	E.B. ($50)

Physiology (continued)

TITLE	AUTHOR & OR PRODUCER	PHYSICAL DATA	LOAN & OR RENT	SALE
Endocrine glands	A. J. Carlson H. G. Swann	11 min., sd., b&w., 1939	Kansas ($2)	E.B. ($50)
The functions of the ear in health and disease	H. G. Kobrak	31 min., sd., color, 1946-48	M.F.G.	
How the ear functions	J. R. McCrory	1 reel	K.B.	K.B.
How the eye functions	J. R. McCrory	1 reel	K.B.	K.B.
Intrinsic contractility of the heart of the mammalian (rat) embryo	E. K. Hall	[illegible] ft., b&w., 1941	Wistar ($2.50)	
Kidney function in health	A. C. Corcoran D. C. Hines I. H. Page	39 min., sd., color, 1948	Lilly	Lilly
Mechanics of breathing	Science Pictures			
Mechanisms of breathing	V. Johnson	15 min., sd., b&w., 1936	Kansas ($2) C.F.I. ($1)	E.B. ($50)
Principles of respiratory mechanics	Harvard Univ. School of Public Health Science Pictures, Inc.	22 min., sd., color, 1955		M.T.P. ($145) N.I.F.P.
Work of the kidneys	A. J. Carlson H. G. Swann F. J. Mullin	11 min., sd., b&w., 1939	C.F.I. ($1)	E.B. ($50)

TITLE	AUTHOR &/OR PRODUCER	PHYSICAL DATA	LOAN &/OR RENT	SALE
Radiography				
Cinefluorographic studies in angiocardiography	Dept. Radiology Rochester	13 min., si., b&w., 1953	M.A.V.I. ($3)	Roch.
Demonstration of X-ray findings in the normal pharynx	Dept. Radiology Rochester	13 min., sd., b&w., 1953	M.A.V.I. ($3)	Roch.
Mechanism of swallowing	Dept. Radiology Rochester	17 min., si., b&w., 1953	M.A.V.I. ($3)	Roch.
The normal esophagus	R. Janker G. Ramsey J. S. Watson, Jr. S. A. Weinberg	6 min. (at sd. speed), si., b&w., 1953	M.A.V.I. ($2)	M.A.V.I. ($15)
The normal stomach	R. Janker	9 min. (at sd. speed), si., b&w., 1953	M.A.V.I. ($2)	M.A.V.I. ($20)
Reproduction				
The biology of reproduction in rats	E. J. Farris	15 min., si., color, 1942	Wistar ($8) C.F.I. ($2)	
Development of the opossum	E. J. Farris	7 min., si., color, 1941	Wistar ($3)	
Human semen analysis. Motile spermatozoa as an index of fertility in man	E. J. Farris	15 min., si., b&w., 1947 (R 1951)	Wistar ($4.25)	Wistar
Human semen analysis. Technique for counting motile sperm	E. J. Farris	10 min., si., b&w., 1947 (R 1951)	Wistar ($2.25) C.F.I. ($1.50)	Wistar

Reproduction (continued)

TITLE	AUTHOR & OR PRODUCER	PHYSICAL DATA	LOAN & OR RENT	SALE
Human spermatozoa: morphology and motility (spermatozoa of vertebrates, reel III). Studies of living sperm.	E. J. Farris	1 reel, 1951	Wistar ($4)	Wistar
Mating behavior in the leopard frog, Rana pipiens	F. A. Beach E. R. Aronson	250 ft.	A.M.N.H.	
Maternal behavior in the rat and its modification by cortical injury	F. A. Beach	11 min., si., b&w.	Yale	Yale
Observation of human ovulation by the pelviscope	J. B. Doyle	17 min., sd., color, 1953	M.A.V.I. ($8)	M.A.V.I. ($110)
Ovulation in the frog, Rana pipiens	R. Rugh	18 min., si., b&w., 1938	Col. U.	Col. U.
Proestrous and oestrous behavior in the guinea pig	W. C. Young E. W. Dempsey R. Hertz H. L. Myers	7 min., si., b&w., 1941	Wistar ($2)	Wistar
Reproduction among mammals	M. Bradshaug F. T. Howard H. H. Strandskov	11 min., sd., b&w., 1937	P.C.R. ($1.75) C.F.I. ($1.50)	E.B. ($24)
Reproductive processes of the frog, Rana pipiens	R. Rugh	1,350 ft.		Rugh ($65)
Spermatozoa of vertebrates:	E. J. Farris	si., b&w., 1951	Wistar	Wistar
Reel I. Studies of living sperm by phase microscopy			($4)	
Reel II. Spermatozoa of vertebrates			($4)	
Reel III. Human spermatozoa, morphology and motility			($4)	
Studies in human fertility	Audio Productions	42 min., sd., b&w., 1940	Ortho	Ortho

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Reproduction (continued)				
The timing of human ovulation	E. J. Farris	19 min., si., color, 1948	Wistar ($9) C.F.I. ($2)	Wistar
Tropical opossums	E. J. Farris	15 min., si., color, 1941	Wistar ($8)	
Surgical				
Surgical approaches to the:	Churchill-Wexler Film Productions	sd., color	V.A.	C.W.*
Ankle joint	L. C. Abbott J. C. B. deC. M. Saunders (and) P. D. Wilson J. J. Callahan R. D. Ray	32 min., 1952	V.A.	($186.85)
Elbow joint	D. B. Lucas R. D. Ray	39 min., 1950	V.A.	($224.50)
Hip joint	D. B. Lucas P. A. Gregorieff J. R. Close	36 min., 1951	V.A. A.M.A. ($3)	($209.46)
Bones of the foot	R. D. Ray J. R. Close	32 min., 1952	V.A.	($182.20)
Spine and sacroiliac	D. C. Smith	27 min., 1953	V.A.	($161.90)
Bones of the wrist	R. D. Ray P. A. Gregorieff P. D. Wilson, Jr.	34 min., 1952	V.A.	($197.39)
Knee joint	P. A. Gregorieff D. B. Lucas	37 min., 1951	V.A. A.M.A. ($3)	($210.08)
Scapulohumeral joint	M. B. Shaffrath D. B. Lucas	36 min., 1949	V.A. A.M.A. ($3)	($206.38)
Sternoclavicular and acromioclavicular joints	P. D. Wilson, Jr. D. B. Lucas	17 min., 1952	V.A.	($97.77)

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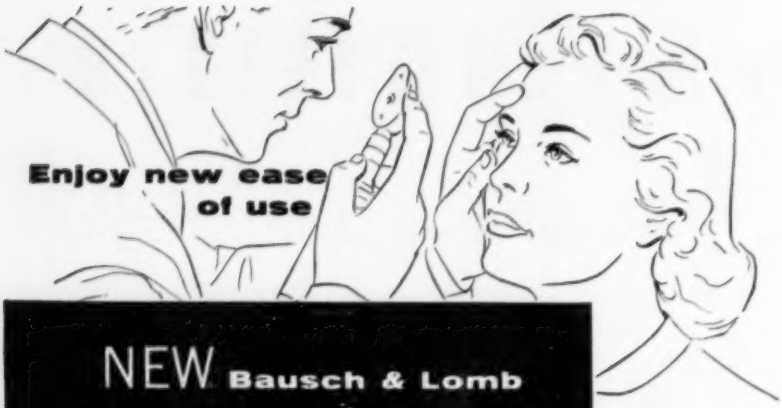

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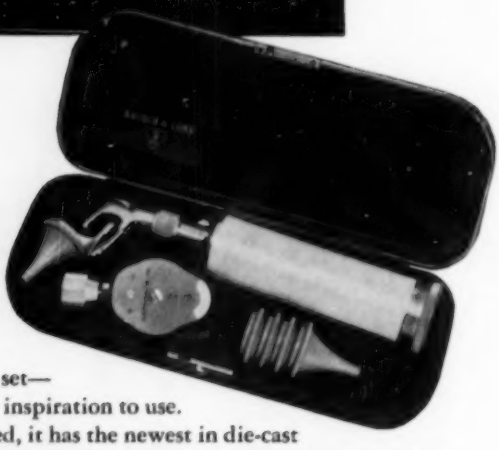

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Surgical (continued)

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Surgical anatomy of the:	C. J. Baumgartner	si., color		
Anterior arm and forearm		15 min., 1941	Squibb	
Breast and axilla		15 min., 1941	Squibb	
Duodenum, small and large intestines		15 min., 1941	Squibb	
Female pelvis		14 min., 1941	Squibb	
Femoral triangle		25 min., 1948	D.V.E.	
Gallbladder and bile ducts		15 min., 1941	Squibb	
Inguinal area		27 min., 1950	D.V.E.	
Lateral neck		10 min., 1941	Squibb	
Parotid area		18 min., sd., 1953	D. & G.	
Peritoneum		14 min., 1941	Squibb	
Stomach and pancreas		15 min., 1941	Squibb	
Submaxillary region and supraclavicular area		14 min., 1941	Squibb	
Thyroid		13 min., 1941	Squibb	
Surgical anatomy of the female perineum (Cadaver demonstration)	R. T. Bergman E. L. Morel	25 min., sd., color, 1952	D. & G.	
Surgical anatomy of the male perineum (Cadaver demonstration)	R. T. Bergman R. W. Barnes E. L. Morel	30 min., si., color, 1951	D. & G.	
Surgical anatomy of the posterior lumborenal area	R. T. Bergman R. W. Barnes E. L. Morel	21 min., sd., color, 1952	D. & G.	
Surgical anatomy of the shoulder. The diagnosis and surgical treatment of shoulder lesions	H. F. Moseley	42 min., si., color, 1952	D. & G.	
Surgical anatomy of elbow	J. E. Markee	72 min., si., color		Markee ($257.74)
Surgical anatomy of the knee (Two films)	J. E. Markee	92 min., si., color		Markee ($328.30)
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Flippin, H. F., and Eisenberg, G. M.: Antimicrobial Therapy in Medical Practice, Philadelphia, F. A. Davis Co., 1955, p. 40.

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Trafton, H. M., et al.: New England J. Med. **252:** 383, 1955.

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36 chronic infections: 30 showed symptomatic improvement, frequently within 24 hours.

Beutner, E. H., et al.: Antibiotics Annual, 1954-1955, New York, Medical Encyclopedia, Inc., 1955, p. 988.

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Hasen, H. B., and Moore, T. D.: J.A.M.A. **155:** 1470, 1954.

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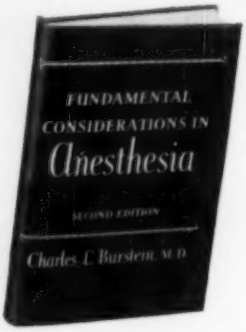

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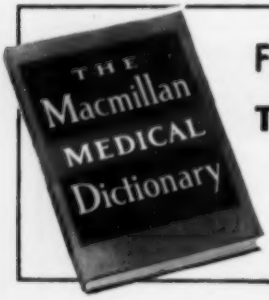

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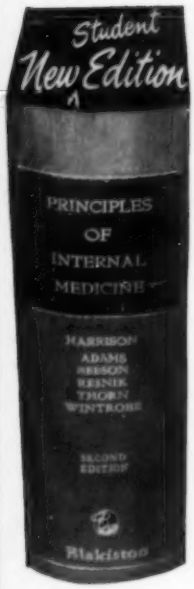

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